FAMILY STRUCTURE, MARITAL FERTILITY AND PREMARITAL SEX AMONG MARRIED AND NEVER-MARRIED WOMEN IN CONTEMPORARY CHINA

A Dissertation

by

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ABSTRACT

According to Chinese traditions, patrilocal residence is believed to be linked with early and high marital fertility. However, despite the rapid fertility decline and the enormous social and economic changes that have occurred in recent years in China, research still shows that family structure in China is relatively stable compared to western countries. This dissertation investigates the effects of family structure on fertility in contemporary China. This dissertation had two main objectives: first, to examine the effects of family structure on the marital fertility of married women; and second, to better understand the effects of family structure on the premarital fertility by examining the effects of family structure on premarital sex of never-married women.

This dissertation utilizes data from the China Health and Nutrition Survey and the Chinese Health and Family Life Survey. Logistic regression model and Cox proportional hazards model are used to to estimate the the effects of family structure on marital fertility and premarital sex. The major finding in this dissertation shows that patrilocal residence has been well preserved in contemporary china. After controlling for relevant factors, co-residence or quasi-coresidence with parents-in-law significantly accelerates the transition from marriage to first birth, and promotes a desire for more children. However, second births are significantly impacted by factors associated with socioeconomic status and family planning policy other than family structure. This dissertation also confirmed the effects of family structure on premarital sex in terms of

behavior, but not in terms of attitudes. After controlling for relevant factors, co-residence with parents significantly decreased the odds of engaging in premarital sex.

To my parents Junsheng He and Min Pan, for all of your support,

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NOMENCLATURE

TFR	Total Fertility Rate
CHNS	China Health and Nutrition Survey
CHFLS	Chinese Health and Family Life Survey
VIF	Variance Inflation Factor
LR	Likelihood Ratio
ML	Maximum Likelihood

TABLE OF CONTENTS

Page

LIST OF FIGURES

Page

LIST OF TABLES

Page

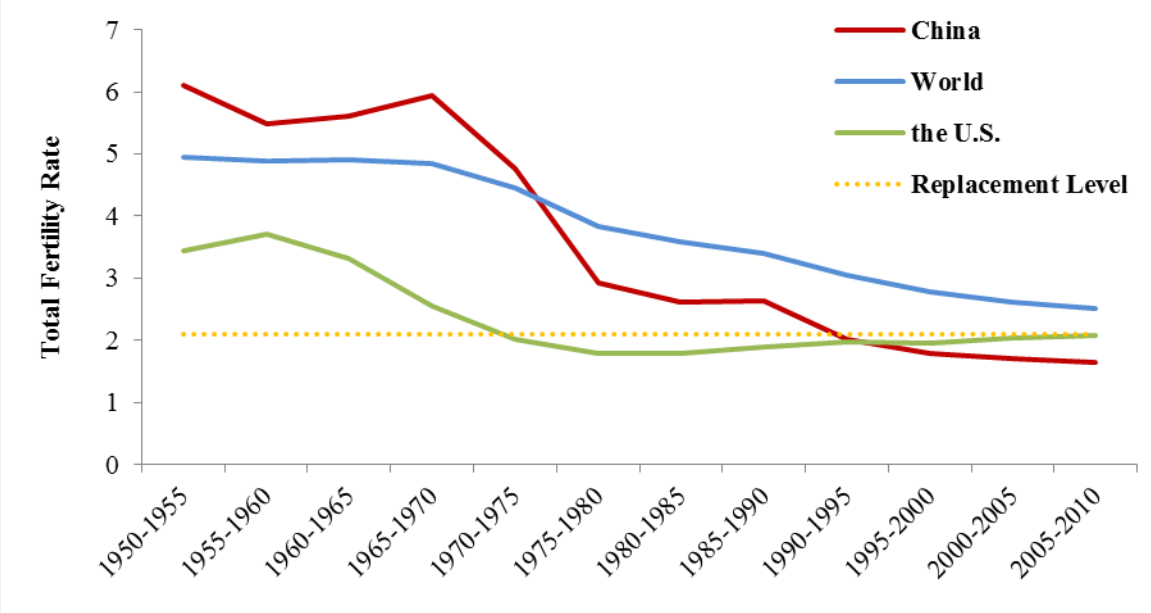
CHAPTER I

INTRODUCTION

Historically and currently the most populous country in the world, China has over 1.3 billion persons as enumerated in the 6th population census on November 1, 2010 (National Bureau of Statistics of China 2011). This large population, which accounts for one fifth of the world's population, has always been a concern for policy makers from various countries as well as the Chinese government. Moreover, as a key component of population change, the rapid fertility decline in China cannot be ignored or overstated. It took a mere four decades for the total fertility rate (TFR) of this extremely populated country to drop from over 6 children per woman in the 1950s to 2 in the 1990s (Figure 1). A similar transition took nearly two centuries in the United States (Jones and Tertilt 2008). Without this dramatic fertility transition, the population of China today could well be 1.7 billion or ever larger. Since the 1990s, China has had a total fertility rate below 2.1, which is the number of children per woman necessary for a developed, low-mortality society to theoretically replace itself exactly (Espenshade, Guzman, and Westoff 2003). According to the United Nations population projection based on medium variant assumption, China's population will reach its peak followed by a process of depopulation around 2025 and will then turn over the title of most populous country to India (United Nations 2011).

How did this transition happen in such a short period of time? There is agreement on the positive effects of socioeconomic development on fertility decline after Communist Party took over power in 1949. It is also believed that this rapid transition partly resulted from strict family planning policy initiated in late 1950s and reinforced in 1970s and 1980s. However, it is difficult to disentangle the contribution of one from the other (Cai 2010; Lavely and Freedman 1990; Poston and Gu 1987). The controversy regarding whether family planning programs or socioeconomic changes were the necessary and sufficient stimulants of fertility decline has received a lot of discussion to this very day (Attane 2002; Cai 2010; Poston and Gu 1987; Tien 1984).

Figure 1.1 Changes in the Total Fertility Rates: China, the U.S., and World, 1950-2010



Source: United Nations, Department of Economic and Social Affairs, Population Division (2011). World Population Prospects: The 2010 Revision, CD-ROM Edition.

While studying fertility at an aggregate level by comparing various indicators of fertility across years and countries is popular and efficient, we should never forget that giving birth to a baby is a personal issue, and is a particularly important life event for women. Obviously, females are the only human beings who bear children, though the timing and quantity of their fertility does not merely depend on their own decisions. Usually, this particular decision-making process never goes beyond families. Before the introduction of a family planning policy, bearing children was a purely family issue in China: families were free to decide their desired fertility and made efforts to achieve it, in spite of the fact that desired fertility is not always achievable due to limited fecundity or lack of effective contraceptive methods. Additionally, the consequences of having children cannot be more influential on families: the cost of raising children is almost totally absorbed by families. The family with more children was likely to have lower living standards due to the cost of raising children, but was also likely to enjoy more returns from the children who were able to provide economic and emotional support to the family. After the launch of a family planning policy, especially in late 1979 when a strict family program known as the "one-child policy" was enacted, the key question for this decision-making process somehow turned to whether or not to obey the allowed number of children set by this "one-child policy." It is inevitable for studies of the fertility transition in China to answer questions concerning the effect of the family planning policy, such as "to what extent did fertility decline in China attributed to family planning" and "would this rapid fertility decline happen without this policy?"

Despite these questions, China was able more or less to achieve the desired fertility levels consistent with the goals of the family planning policy. Under such a rigid and strict policy facilitated by a well-organized system, the decisive effect of family influences on fertility has been easily overlooked given the predefined number of children per family, no more than two children per couple according to the "one-child policy." Under these circumstances, it seems that fertility goes from a private right to a public issue that is largely out of families' control.

But is that undisputable? In spite of the legitimacy of the "one-child policy" itself, if low fertility, say no more than 2, is generally accepted, bearing children is then really a family decision and women do not have to keep in step with each other in terms of timing and quantity of fertility. In fact, the "one-child policy" encourages couples to delay the first birth by offering the extended maternity leave, along with other benefits in various forms, to employed women who give the first birth after age 24. However, none of these benefits is necessary to be a big concern for married couple who plan a first birth. Without strong regulation in any form either prompting or restricting the first birth, the transition from marriage to first birth is actually out of the policy's control. Additionally, for couples who are allowed to have a second child after their first birth, they are free to make their own choice on whether or not to have a second child. In any case, the family plays a key role in encouraging earlier and higher fertility by providing a supportive environment, or the opposite in some cases, for women in the child-bearing ages.

The understanding of the effects of the family on fertility calls for the understanding of the family's function. As the basic social unit, the family is a social network based on culturally recognized biological and marital relationships (Thornton and Fricke 1987). Generally, the family is responsible for "the production, distribution, and consumption of commodities, for reproduction and socialization of the next generation, and for co-residence and transmission of property" (Waite 2006: 88). Reproduction is not necessarily an obligation of a family, but almost every child has been born within a family, especially in China where nonmarital births are very rare. Even though there is a policy outside of the family that tries to influence an individual's fertility behavior, it is always meaningful and feasible to understand the role of the family in fertility, particularly in analyses of low parity births.

When talking about the influence of the family on fertility, the structure of the family, that is, the family household, stands out as being particularly important. The co-residential pattern does not only reflect the way that family members are organized effectively as an economic unit of production and consumption, but it also depicts the unique relationships between the family members, which result from a balance of each member's power and influence, as determined by their socioeconomic status and other cultural factors. The extended family was believed to be the dominant family structure in China historically. In this particular social context, the extended family generally referred to a patrilocal residence with multiple generations. Moreover, it often implied high filial piety as demonstrated in the in the ownership of the older generations and the absolute obedience of the younger generations. Finally, the most important argument

related to fertility is that the extended family is likely to be associated with high fertility, while the nuclear family is said to facilitate fertility decline.

However, is it still the case that the extended family is the dominant family structure in contemporary China? According to data from the most recent census taken in 2010, the average family household had 3.10 persons, which is a decrease from 3.44 persons as enumerated in the 2000 population census, and 3.96 persons in the 1990 population census (National Bureau of Statistics of China 2001; National Bureau of Statistics of China 2011). Theoretically, a family of 3 persons is very likely a typical nuclear family consisting of a married couple and their only child. Despite the falling average family household size during the last two decades, this summary measurement conceals variation in family household structure. According to the 2000 census of China, nearly 20 percent of the over 340 million family households in China contained three or more generations, with the other 60 percent family households composed of two generations (National Bureau of Statistics of China 2000). These numbers of course do not provide solid evidence of a universal or widespread pattern of extended families in contemporary China. However, they suggest that the co-residence of parents and their adult children could be a popular family structure to a great extent. Hypothetically speaking, there could be hundreds of millions of family households in China made up of two or more generations that at least contain aged parents and their adult children. In the meantime, the U.S. 2000 census data showed a similar average family household size, 3.14 persons per family households, but the census data identified 3.9 million multigenerational family households, which made up only 3.7 percent of all households,

much lower than that of China (U.S. Census Bureau 2001). How could that happen? One possible explanation relies on low fertility and the importance of traditional family structure in China. With such a small number of children available, the traditional pattern of the co-residence of parents and adult children is still maintained even though it is not preserved in every family household.

With the above and related issues in mind, I became interested in investigating the influence of family structure on fertility in contemporary China. Considering the relatively small family household size and low fertility, I will especially focus on the effect of co-residential parents rather than other non-lineal relatives. Because patrilineality and filial piety are so highly valued, the essential features of the traditional Chinese family are two: dominant parental control over children, and patrilocal residence (Zang 1993). These two features at least imply two issues for married couples who co-reside with parents, particularly with the parents-in-law of the married women. First, the young couple's fertility reflects more or less the co-residential parents' preferences. Additionally, economic and emotional support interchanged between married couple and co-residential parents is expected. Either way, co-residing with parents could well lead to higher fertility compared to living without parents. According to Chinese traditions, a woman is not regarded to be an adult until she has a spouse and children; the same applies to a man. In a very typical scenario, parents are very likely to become uncomfortable if their young adults get too much older while remaining single, and they are usually willing to provide childcare services to their children as an incentive for them to marry and have children. Obviously, living far away from parents makes this

situation not possible, but once a young adult lives with his/her parents in the same household, it is easier for them to follow the parents' instructions. In that case, not only could grandparents have their treasured grandchildren, but young adults could also benefit from free childcare service provided by their parents. Although this is very attractive for both sides, higher educational attainment often results in more and more young people leaving their hometowns and choosing their own life styles. They might still receive economic support from their parents, but the parents' influence is weaker since they spend much less time together. Therefore, higher fertility in an extended family seems obvious and reasonable, and this statement has been supported by other researchers (Burch and Gendell 1970; Davis 1955; Mason 2001). But even the most recent study on this topic relied on data collected nearly twenty years ago (Chen 2006). With the economic development and social changes that have occurred in China in the past two decades, does family structure still have that effect on fertility? The resulting knowledge could potentially lead to a better understanding of this classic question in a contemporary social context.

I do not only plan to focus in my dissertation on the effect of family structure on marital births, I will also take into consideration the effect of family structure on nonmarital fertility. Unfortunately, never married women have been regularly excluded in official national surveys of fertility (Li and Newcomer 1996), as well as other surveys related to fertility in China. Thus I will examine the sexual activities of never married women as an alternative. Only those who are involved in sexual intercourse are at the risk of getting pregnant and giving birth to children. Unlike sex within marriage,

premarital sex has been morally unacceptable in almost every human society that regards marriage as the legitimate requirement for sexual behavior (Christensen 1960). This began to change in 20th century, starting with the so-called "sexual liberation" in the Western world in the 1960s and the 1970s. This refers to the increased acceptance of sexual behavior outside of traditional marriage relationships, including premarital sex among never married young adults (Bell and Coughey 1980). Twenty years later, a similar but quieter sexual revolution was observed in Asia, a more conservative culture (Rindfuss and Morgan 1983; Walther 2006). Although this particular sexual revolution emphasized an increase in intercourse frequency, it may also be seen as an increase in premarital sex (Zhou 1989). Generally speaking, it is a tradition that never married people stay at their parents' homes until they get married, though they might have the ability to live independently before getting married. Nonetheless, as a consequence of the increasing incidence of internal migration due to the pursuit by many of higher education or better job positions, it is inevitable for many never married young adults to move out of their parents' homes. The first consequence of this is an increase in premarital sex. Having one's own private space without the parents' control and influence definitely provides a comfortable, if not encouraging, environment for sexual activity. But as I mentioned before, whether or not one moves out and lives on one's own is closely related with socioeconomic status. The question is thus: to what extent does co-residence with parents influence premarital sex? Is the influence real, or is it a superficial relationship that is actually determined by socioeconomic status or some other related factors? All these questions will be addressed in this dissertation.

Overall, the purpose of my dissertation is to examine the effects of family structure on the fertility of married women and on the sexual activity of never married women. Both will provide us with a better understanding of the relationship between family structure and fertility. My research will be conducted in two separate sets of analyses, which will allow me to utilize the available datasets in the best way. By doing so, I will seek to identify how family structure influences fertility by taking both married and never married women into consideration. For each group of women, I will consider a range of questions related to their family structure and fertility, for example:

- What is the general pattern of fertility for married women?
- Is patrilocal residence still a dominant pattern of family structure of married women?
- Does co-residence with parents or parents-in-law lead to a stronger desire for children?
- Does co-residence with parents or parents-in-law lead to higher fertility?
- Are there other factors that are more important for determining married women's fertility?
- To what extent do never married female adults participate in premarital sex?
- Do they tend to live with their parents or stand on their own?
- Does co-residence with parents effectively keep never married women away from premarital sex?

These questions are among those that I will address in an effort to better grasp the relationship between family structure and fertility. Particularly, I will consider co-residence with parents or parents-in-law as the key indicator of family structure, and rely on quantitative analyses to answer the questions.

CHAPTER II

LITERATURE REVIEW

This chapter reviews the general literature dealing with the fertility transition in China. I give special attention to the family planning policy, changes in the Chinese family structure, and the effects of family structure on fertility and sexual activities.

2.1 The Fertility Transition in China

2.1.1 An Overview

2.1.1.1 Population and Fertility in Historical Context

The growth of the population of China has a long history that spans thousands of years. Many censuses from the Han Dynasty to the Qing Dynasty are available as historical data, and they cover nearly two thousand years of the history of China (Durand 1977). These population records were primarily collected by local registers for administrative purposes, such as tax collection or military recruitment. As a result, the historical population data almost inevitably underestimated certain subpopulations, usually males. The underestimation was largely caused by unreported households and individuals who intentionally tried to escape the unpleasant duties that drove the data collection processes. What made the recorded population even lower was the fact that females and children were likely to be neglected because they did not really matter to administrative officials in most cases. Also, owing to the frequent changes in territory as a result of the invasions of other countries and also China's invading still other countries,

the reliability of the historical population data is a little questionable. When these data are used to capture the history of the modern population of China in the sense of the same geographic coverage, it could be very problematic. But in spite of all the drawbacks, the historical data provide precious information for population estimation. After rigorous investigation of the available data and the evaluation of the various population estimates by other researchers, Durand (1977) suggested a large Chinese population with a range of 70 to 90 million at the beginning of the Christian Era, followed by a fluctuating population of ups and downs with little net increase over the next one thousand years. He further discerned four major periods of population expansion, during the eleventh century, the fifteenth and sixteenth, the eighteenth and early nineteenth, and the twentieth century, all of which were times of prosperity and power. According to his research, the total population of China was 432 million at the end of the Qing Dynasty in 1851, more than seven times the population in the earlier Han Dynasty in A.D. 2 (Durand 1977). In the following century, the population increased to over 600 million according the record of the first modern population census conducted in 1953 (National Bureau of Statistics of China 1954).

Compared with the changes in total population, it is even more difficult to reveal the dynamics of fertility change in an historical context. Before the development of modern statistics of population, tracking individuals' fertility records was almost impossible. In addition to the impossibility of keeping complete records for thousands of years, there was not much motivation to investigate individuals' fertility. Given the high mortality, surviving children, especially males, were more essential to the maintenance

of families and states because they provided labor for productive and military activities. Therefore, recording each birth was neither important nor necessary for families.

Nevertheless, the remarkable history of Chinese society over thousands of years seems to suggest a sufficiently high historical fertility, allowing the population successfully to reproduce and increase its numbers in the long-term. The notion that the production of children was favored in China provides an easy way to explain how Chinese societies maintained such a large population for such a long time under the circumstances of frequent epidemics, recurrent famines, and nationwide rebellions. However, the high mortality and malnutrition made it impossible to expect China to achieve natural fertility levels such as those of the Hutterites.

Studies of historical fertility using empirical data and modern demographic analytical methods first appeared in the 1970s. Data from the Chinese Farm Survey reflected a total fertility rate varying from 5 to 6 in the different regions of the country from 1929 to 1931. This fertility level was lower than that of pre-modern Europe and was far below women's fertility potential (Barclay et al. 1976). A reassessment of the Chinese Farm Survey data by Wolf (1984) questioned the accuracy of the previous estimates, but the adjusted total fertility rate in this study was still no more than 7. Both studies found that the total marital fertility rate of China at that time was moderate compared to that of pre-modern Europe, although Wolf insisted that the fertility level was not as low as that calculated by Barclay, Coale and colleagues (1976). Wolf was questioning the relevance of the old saying that a large family and high fertility were essential characteristics of Chinese families.

Data from other sources made the debate on China's historical fertility more intense. Based on the analysis of the genealogical archives of the Qing imperial lineage, Wang and his colleagues (1995) revealed a pattern of low marital fertility of lineage couples, ranging from four to five children during the eighteenth and nineteenth centuries. Again, their statement of low fertility during that period was challenged by Wolf (2001), but Wang and colleagues successfully defended themselves by clarifying the data sources and justifying their adjustment methods, while questioning the deficit data and methods used in Wolf's studies (Cameron, Wang, and Lee 2002). In Lee and Wang's work (1999), they suggested that the total marital fertility rate of China has been lower than 7 since the thirteenth century. They identified this low marital fertility as one of the most distinctive features of the Chinese demographic system.

2.1.1.2 Population and Fertility in Contemporary China

After the Communist Party took power in China in 1949, the new government began conducting population censuses, first in 1953, followed by five more in 1964, 1982, 1990, 2000 and 2010. The census data provide clear and solid evidence of population change. The population of China doubled in less than half a century, from 602 million in 1953 to 1.3 billion in 2000 (National Bureau of Statistics of China 1954; National Bureau of Statistics of China 2000). The most recent figure from the 2010 census is a total population of 1.34 billion (National Bureau of Statistics of China 2011). Besides the China censuses, the national sample surveys conducted every year since 1982 have been serving as an important supplement to fill the gaps between the censuses and to provide information on behaviors and characteristics for which data are not

collected in the censuses. The surveys provide plenty of high quality data for the studies of population and fertility changes in contemporary China.

Since the 1950s, China has experienced a dramatic demographic transition, most especially characterized by a rapid decline in fertility. The crude birth rate of China decreased from 42 in the early 1950s to 13 in the late 2000s; correspondingly, the total fertility rate dropped sharply from over six children per women to less than two (United Nations 2011). This shift made China a popular focus for investigations of the demographic transition as well as analyses of fertility control and other related issues. According to the official report from the Chinese government, the total fertility rate fluctuated at around six children per woman between 1949 and 1958. It then dropped to 4.3 in 1959, followed by a continued decrease in 1960 and 1961. In 1962, the total fertility rate rebounded to 6.02 and then climbed to 7.5 in 1963, which is its highest recorded level after 1949. From 1964 to 1971, the total fertility rate stayed at a level around 6, which was the normal level before the sudden decrease from 1959 to 1961. The year 1972 is noticeable because this was the first time a total fertility rate lower than 5 was recorded after 1949. From that time on, the total fertility rate decreased steadily year by year, with exceptions in a few years when fertility rebounded a little compared to the previous year, but did not necessarily alter the trend of fertility decline. In 1990, China successfully decreased its total fertility to two children per women, even lower than the replacement level (China Population and Development Research Center n.d.).

2.1.1.3 What Can We Expect in the Future?

What will happen in the twenty-first century? Will the low fertility keep going down to make China a country with lowest low fertility? Or will families in the new century replicate the model of a so-called traditional Chinese family with relatively high fertility? According to the newest data from the 2010 census, the total fertility rate of China was around 1.18 (Population Census Office under the the State Council, Department of Population and Employment Statistics, and National Bureau of Statistics 2012). If this number reflects the real fertility level in China, this would place China on the list of countries with the lowest low fertility, which are countries with total fertility rates below 1.3 (Billari 2004). Even without any conclusive agreement on the accuracy of this reported very low fertility level (Cai 2012; Zhao and Chen 2011), no one would doubt that China has already achieved a very low fertility level, certainly much lower than the replacement level. The projection of future fertility change is more challenging. The notion that Chinese people favor large families is ever-present, which calls for both rational thinking and enough courage to make the assumption that the Chinese people have an interest in maintaining, or even lowering their already low fertility in the future. The Chinese government always seems to be reluctant to publish any official projections of fertility. However, both the United Nations and the U.S. Census Bureau have met this challenge. According to data from the International Data Base prepared by the U.S. Census Bureau, the total fertility rate of China is set at 1.5 in the first decade of the twenty-first century, then increasing to 1.6 in 2013. In 2037, it is set at 1.7, which is

assumed to be maintained until 2050, the last year of this projection (U.S. Census Bureau n.d.).

The United Nations projection is less specific; it provides four scenarios of changes in the total fertility rate of China in the twenty-first century, based on low, medium, high, and constant assumptions. The low level assumption results in fertility varying from 1.03 to 1.51, while the high level generates fertility ranging from 1.81 to 2.51. The medium level suggests slight increases in fertility after 2010, which leads to the projected fertility rate in 2100 of 2.01 (United Nations 2011). Even if one doubts the questionable total fertility rate of 1.18 based on the 2010 census, it is still unlikely that China will have a total fertility rate higher than the replacement level of 2.01 in the twenty-first century.

2.1.2 Fertility Control, Family Planning Policy and Socioeconomic Development

2.1.2.1 .Fertility Control in the Historical Context

Given the general impression of the fertility transition in China, it is normally assumed that fertility control was absent and fertility was high until the official family planning policy was launched in China in the 1970s. However, many researchers have devoted themselves to reinvestigating fertility levels in the historical context. As mentioned above, the most significant findings have been generated from studies focusing on the period from the eighteenth century to the early twentieth century. Besides providing evidence of infanticide, research on marital fertility among the Qing nobility clearly disproved the common assumption that preventive fertility control was absent in the historical context. Based on the genealogical archives of the Qing imperial

lineage, low marital fertility was partly attributed to deliberate fertility control through regulating the sexual activities among lineage couples during the eighteenth and nineteenth centuries (Wang, Lee, and Cameron 1995). In addition, this study puts forward three mechanisms of deliberate fertility control, including late starting, early stopping, and wide spacing. These three mechanisms caused a fundamentally different fertility pattern in the Chinese population from that of the European populations; finally, such mechanisms led to a significantly lower marital fertility in the Chinese population than in the European populations at that time.

What needs to be clarified is that these three mechanisms were hardly monolithic, and their effects varied by marriage type and socioeconomic status (Wang, Lee, and Cameron 1995). Nevertheless, the existence of these three mechanisms provided evidence that the idea and practice of fertility control existed among married couples even without modern contraceptive methods. Additionally, decision-making processes involved in fertility were highly limited within families. Although exogenous factors such as famine, war, and natural disasters definitely influenced family decisions, pressure from people other than family members was very rare, and there was no measurable effect from any compulsory regulation such as a nationwide family planning policy, because this policy had yet to be implemented.

Beyond the historical data discussed above, the first national fertility survey conducted in 1982 also provided some evidence of conscious fertility control among women born in the early twentieth century, but this practice largely depended upon the achieved fertility (Zhao 2006). Direct quantitative evidence of contraception use and

abortion prior to the twentieth century is difficult to obtain; however, historical records showing China's long history of using medical substances and other methods to prevent pregnancy or to induce abortion can be traced back to the fifth century (Zhao 2006).

2.1.2.2 The Effects of the Family Planning Policy

Next, I will briefly review the history of family planning policy in China and its direct influence on population changes. The idea of a national campaign of family planning first came about in the mid-1950s, as part of the health campaigns incited by a demand for effective fertility control from women, especially by female workers whose family accommodations were limited. At that time, the main purpose of the policy was to help women avoid unwanted births, which potentially prevented women from working during pregnancy and after delivery, and thus adding to the financial burden of their families. The first two campaigns introduced in the 1950s and the 1960s were relatively limited. The specific goal of controlling national population size was not specified, and no forced regulations were implemented (Han 1957). These initial ineffective efforts were halted by the Great Leap Forward and later by the Cultural Revolution (Aird 1972). In general, at this stage, fertility control was primarily a personal issue; whether or not, or to what magnitude, couples deliberately controlled their fertility was highly dependent upon their own preferences.

The first truly large-scale, effective program was launched in 1971, featuring the later-longer-fewer campaign. Later marriage, longer spacing between births, and fewer children were aggressively and simultaneously advocated. Specifically, the age promoted for a first marriage was set at 28 and at 25 for urban males and females,

respectively, and at 25 and at 23 for rural males and females, respectively. Three or four years between births, three children per rural couple, and two children per urban couple, were all principles that were generally advocated. The notion of "fewer" was further intensified in 1977 to a formal limit of two children for all couples, regardless of their place of residence (Bongaarts and Greenhalgh 1985).

With the government's increasing commitment to socioeconomic development, the family planning program was reinforced in the late 1970s under the presumption that controlling population size was a necessary condition, and this was grounded in macroeconomic rationales. In early 1979, the one-child family planning policy was initiated. Some researchers have called it the most intense family planning program in human history (Lapham and Mauldin 1984). However, the one-child policy is not as extreme as might be interpreted from the literal meaning of its name. Only Han nationalities were subject to this regulation. Minorities and couples in extenuating circumstances were allowed to have a second child, though the flexibility of the plan was very limited (Bongaarts and Greenhalgh 1985).

Impediments to the implementation of the one-child policy were numerous, deriving not only from traditional norms, but also from related policies. The new marriage law took effect in 1981, reducing the marriage age and invalidated the age minimums imposed by earlier local family planning regulations. Changes to the legal marriage age led to a new round of top-down coercion, stimulated by a projected flood of marriage registrations, followed by a rising birth rate over the next several years. Fertility control became a constitutionally mandated duty in 1982, and the principles of

the family planning policy were applied nationwide on a provincial basis (Attane 2002). The one-child policy has been relaxed gradually since 1984 in the hope of reducing the resistance from the local population without undermining the importance of the policy (Bongaarts and Greenhalgh 1985). Particularly, allowing daughter-only households in certain rural areas to have a second birth, a policy introduced in 1984, was officially extended to all rural areas in 1988 (Greenhalgh 1986; Zeng 1989).

The overall achievement of the family planning policy, which is directly evident from the rapid fertility decline, is generally recognized (Feeney and Wang 1993; Greenhalgh, Zhu, and Li 1994). Its accomplishments can be explained by the following factors. First, an extremely effective delivery system for contraceptive services was established. This system effectively carried out all necessary abortions, sterilizations, and IUD insertions. It also successfully delivered modern contraceptive methods to all women of childbearing age. Second, this system successfully promoted the idea that small families were best through mass education and mass media. Finally, the single most important factor was the direct administrative pressure on individual Chinese families applied by family planning cadres and other officials who were themselves under pressure to achieve quick results (Aird 1982; Hardee-Cleaveland and Banister 1988).

It should be noted that the Chinese people never really fully complied with this policy; if they had, the fertility rate would be lower than what has been observed. As an outcome of the policy makers' determination in pursuing macroeconomic growth, the family planning policy did not thoroughly concern itself with its possible micro-social

effects on the family unit, or the health costs for women in the 1970s and 1980s (Bongaarts and Greenhalgh 1985; Ping and Smith 1995) which resulted in bottom-up resistance. Some families adjusted their desired fertility levels to that required by the policy, while others passively controlled their behavior to avoid any socioeconomic penalties resulting from unauthorized births. Clearly, however, some were not willing to change their preferences or to give up their right to determine their desired number of children (Attane 2002; Hardee, Xie, and Gu 2004; Li 1995). Since the desired level of fertility did not decline to lower than two, only a few years after the one-child policy was initiated researchers began to propose more relaxed alternatives to the one-child policy, such as a two-child policy (Bongaarts 1994; Bongaarts and Greenhalgh 1985; Greenhalgh and Bongaarts 1987; Li 1995). However, no fundamental changes at the national level concerning restrictions on fertility have been made so far, in spite of the fact that permission for second births has been extended to more and more couples, including couples where both were themselves only children e (Short and Zhai 1998; Zeng 1989), and that individuals' rights have been taken into greater and greater consideration (Winckler 2002).

2.1.2.3 The Effects of Socioeconomic Development

The fertility decline in China should not be seen as being caused solely by the success of family planning programs. The famine which China faced from 1959 to 1962 in China, which also resulted in a sudden drop in fertility, is a good example of Malthus' idea of positive checks. In general, it has been widely observed that socioeconomic status was negatively related to fertility level and fertility decline, and positively

associated with the implementation of family planning programs. Both aggregate level and individual level studies have provided evidence that urbanization, education, income, living standards, the social status of females, and life expectancy at birth likely created some of the conditions necessary for the fertility decline (Ding and Hesketh 2006; Greenhalgh, Zhu, and Li 1994; Lavely and Freedman 1990; Merli and Smith 2002; Poston and Gu 1987; Tien 1984; Wang 1988), although the independent effects of these factors may have been been reduced after the implementation of the family planning policy (Birdsall and Jamison 1983). On the other hand, as a result of China's rapid socioeconomic development and massive structural reforms, many methods that had seen success in promoting the regulation of fertility during the collective period were no longer effective. The potential risk of being laid off from one's employment, certain other financial incentives and disincentives, and personal persuasion from one's immediate group all became less influential, and the forecasting of who would successfully be able to conceive and deliver became more and more unreliable. Under these circumstances, families who sought to achieve a preferred number or preferred sex composition of their children could either run away from family planning workers (Peng 2000), or bargain with them over methods of fertility control and reproduction allowing families to be able to pursue their own preferences while family planning workers simultaneously accomplished their assigned tasks (Merli, Qian, and Smith 2004; Zhang 1999). In contemporary China, controlling private decisions within the context of the current social and economic system has become even more problematic (Attane 2002).

2.1.3 Son Preference

When talking about the fertility transition in China, it is imperative to look at the social preferences for sons, long a major part of Chinese culture, and which to a significant extent has influenced people's fertility behavior. Son preference refers to the preference for individual sons over daughters, as well as the preference of more sons over more daughters in terms of the total number of children in a family. The latter emphasizes the social preference for a large quantity of sons. As has been discussed earlier, this may only be a perceived preference not borne out in reality. The former, however, recognizes the value of a son as a means of continuing the family line. The value of a son in continuing the family line is illustrated by various social norms and traditions that favor male inheritors, such as how children take only their father's surname, how only sons' names appear on a family genealogy, and how Chinese families often adopt a nephew if there is no biological son in the family (Chan et al. 2002). Much of the importance of son preference is due to Confucianism, a key aspect of Chinese culture since the Zhou Dynasty.

Besides ideological reasons for son preferences, there are at least two economic reasons, especially in agricultural Chinese society. First of all, it is a son's responsibility to take care of aging parents. Second, sons provide a valuable labor force for the farm or family business (Feeney et al. 1989). However, records of fertility control appear as early as thousands of years ago, and the disadvantages of having a large number of children have long been recognized. Even couples who believed that their families

would benefit from more sons might still be restrained by such realities as limited resources (Zhao 2006).

The 1982 One-Per-Thousand National Fertility Sample Survey provided the first incontrovertible evidence of the persistence of son preference. Investigations utilizing data from this survey demonstrated that many couples exhibited a strong preference for having at least one son, and some showed a desire for at least two sons (Arnold and Liu 1986). The increasing sex ratio at birth gave additional indisputable evidence of the prevalence of the son preference (Bhattacharjya et al. 2008; Zeng et al. 1993). Sex-selective abortions were widely reported, especially when earlier births were female (Chu 2001). The Chinese government intended to promote gender equality in order to facilitate the implementation of the one-child policy. However, not only the informal local regulations, but also the formal provincial and national family planning policies were modified to accommodate the demand for sons among peasants by allowing rural couples with only one female birth to have a second birth (Greenhalgh 1994; Li 1995). Qian's (1997) micro-studies suggested that the sex of the first child was a strong predictor of whether or not there would be a second birth.

2.2 Changes in Family Structure in China

2.2.1 Definition of Family Structure

As a basic social unit, the family is a social network based on culturally recognized biological and marital relationships (Thornton and Fricke 1987). Generally, the family is responsible for "the production, distribution, and consumption of commodities, for reproduction and socialization of the next generation, and for co-

residence and transmission of property" (Waite 2006: 88). Family members do not necessarily always live in the same household, but when researchers talk about family structure, they commonly are referring to the structure of a family household in which family members do share the same housing unit.

> The axes of family structure are generation and gender" (Ryder 1983: 20). From the perspective of the generational role, the two most popular family structures are the extended family and the nuclear family. The nuclear family, synonymous with the conjugal family, consists of one adult couple and their unmarried children, while the extended family, also known as the consanguineous family, consists of "the head of the household and his/her spouse (if any), their unmarried children (if any) and their married sons or daughters, each with their spouse and children (if any)" (Burch and Gendell 1970: 232). The stem family is yet another form, which refers to a family that consists of "a couple living with possibly the head's unmarried siblings and/or parents, one married child (commonly a son) and his or her spouse and possibly the unmarred children of either or both couple(s). (Burch and Gendell 1970: 232)

When focusing on countries with strong son preferences, such as East Asian countries greatly influenced by Confucianism, integrating the gender role perspective is necessary when examining family structure. In this case, patrilocal families and matrilocal families are the two basic types. The patrilocal family refers to a family where a married couple resides with or near the husband's parents. Conversely, the matrilocal family refers to a family in which a married couple resides with or near the wife's parents; thus, the female offspring of the mother live in or near the mother's house.

2.2.2 Family Structure in China

2.2.2.1 Ideal Family Structure

Discussions of the family structure in China usually concentrate on the extended family and patrilocal residence, though there are other ways to distinguish different types

of family structure. According to the Confucian values of propriety and order, an ideal family is one in which a large number of family members of kinsmen, their wives, and children all reside under the control of a single patriarch (Freedman 1961a). Thus the two most significant features of the Chinese kinship system, patrilineality and patrilocality, work as the primary principles of family formation and organization. Patrilineality refers to passing family lines and assets through the male line, and tracing relationships exclusively through male members. Patrilocality involves a married couple residing at the husband's parents' home. These two features also apply to many other societies around the world, such as many peasant European societies, but they are principles to which the Chinese rigidly adhere, especially in peasant societies (Das Gupta et al. 2003; Freedman 1961a). In spite of the consistent preference in China for this ideal family structure, generally only wealthy families owning land and other resources successfully have approached this model. The greater part of the population has failed to reach or maintain this traditional ideal due to a lack of surviving generations within the same family, poverty, or a general lack of power (Chen 1985; Freedman 1961a; Zeng 1986). However, the preference for such a family type has historically been clearly evident, in that those who had the opportunity to live in such a family were sure to do so (Parish and Whyte 1978).

However, times change, and we must ask the question: what has happened to families in contemporary China? What is the typical family structure now? Is the extended family with patrilocal residence still preferred? In the next several paragraphs,

I will discuss these issues based on information gained from the previously published literature.

2.2.2.2 Changes in Family Structure in Contemporary China

Changes in family structure can be revealed in several aspects. First, let's review of the changes in family size. Studies about changes in family structure in China over the past half century have confirmed that it is incorrect to assume that, historically, typical Chinese families were usually large. Empirical studies have indicated that the average family household in China before 1949 was relatively small (generally, five to six members). This number contrasts sharply with the widespread assumption of co-residence of several generations, and an overall large family size (Barclay et al. 1976; Freedman 1961a). From 1949 to 1982, the average family household size fluctuated between 4.3 and 4.8 (Chen 1985; Zeng 1986). This number decreased to 3.96 in 1990, and further declined to 3.44 in 2000 (National Bureau of Statistics of China 1990; National Bureau of Statistics of China 2000). The most recent census data reflect that the average family household size in China was 3.10 in 2010 (National Bureau of Statistics of China 2011).

It seems that the trend of turning to a smaller family size is irreversible in China. Is this change companied by a decrease in the prevalence of the family structures that usually require the presence of a relatively larger number of family members, such as an extended family? Actually, despite the overall decreases in average family size, the family structure in China has been quite stable during the past half century. The popularity of the traditional family structure is not, simply attributable to cultural

transmission, but has been reinforced by official policies and structural arrangements (Whyte 1979).

Since 1949, young people have enjoyed more freedom in job searches and dating, women's overall social status has increased (Ching 1982), and training programs for children provided by non-familial institutions have become more widely available (Thornton and Fricke 1987), but none of these changes, necessarily, have weakened the patrilocal co-residence principle. The household registration system successfully controlled internal migration before the 1980s, which certainly decreased the possibility of forming new independent households. Despite the fact that internal migration increased significantly after the 1980s, there is little evidence to conclude that geographic and occupational mobility had a tangible negative influence on the extended family. First of all, developments in public transportation made distance between work and home less critical to family members, thus facilitating the sustaining of large families under a single roof (Litwak 1960a; Litwak 1960b).

In addition, some traditional values were indirectly promoted by official policies. According to the Chinese traditions, youth should be respectful, parents are responsible for raising their own children, and adult children are responsible for looking after their aging parents (Freedman 1961a). These responsibilities are reinforced by certain elements of the official marriage law in China.

Moreover, limited social services and housing opportunities have left many families with no other choice than co-residence (Chen 1985; Freedman 1961a; Goldschmidt and Kunkel 1971; Lavely and Ren 1992; Li, Feldman, and Jin 2003; Tsui

1989; Whyte 1979; Zeng 1986; Zhang 2004). The historical loyalty for this type of family structure not only corresponds to a life course characterized by the integration of young couples into the home of the groom's family, under a situation similar to the fixed cultural model discussed earlier (Freedman 1961a; Whyte 1979), but such loyalty is also influenced by the realities of living in modern China, where young families regularly face issues such as a shortage of housing or the need to care for elderly relatives (Cartier 1995; Chen 2005; Chen 1985; Logan and Bian 1999; Logan, Bian, and Bian 1998).

Contrary to the trend of preserving traditional family structures via patrilocal residence, there have been certain variations on traditional Chinese households which reflect traditional preferences but are more practical within the context of life in contemporary China. For example, living near the husband's family is an alternative to co-residence. Family members often live in close enough proximity to perform similar family functions such as the offering of financial assistance and caretaking among the generations to those who co-reside, but are able to avoid potential conflicts between generations and among couples that may result from physical co-habitation (Chen, Short, and Entwisle 2000).

In addition, uxorilocal marriages increase the parents' chances of co-residence with married daughters. Under the family planning policy, only one child is authorized in most cases, especially in urban areas. As a result, singleton daughters are more likely to enjoy support from their own parents, and to provide parents with support in their old age in return (Fong 2002). In that case, uxorilocal marriages are well adapted as a strategy of family recruitment (Han 2003; Li, Feldman, and Jin 2005).

2.3 Family Structure and Fertility

2.3.1 Theoretical Considerations

Fertility refers to the capability of individuals to produce the next generation, and in societies is considered as one of the most important functions of the family. As mentioned above, China has experienced a rapid fertility decline, yet at the same time it has been highly successful in keeping its family structure, to a great extent, traditional. Over the last few decades, many studies of fertility in China have directed attention to institutional factors, particularly to the one-child policy and socioeconomic reform, and have expended less effort in discussing the influence of families on the fertility transition. It would be interesting to investigate how fertility has been influenced by the relatively stable family structure under the specific social context in China, a context that is characterized by a rigid fertility control policy and rapid socioeconomic development. This will be a major objective of this dissertation.

The major theoretical analyses addressing the relationship between family structure and fertility first emerged in the 1950s. After analyzing fertility levels in various culture contexts within which the family was the vital functional element, Lorimer noted that the extended family in agrarian societies in China was positively related to a high level of fertility (Lorimer 1954). In his explanation, extended families and high fertility levels interacted as both causes and effects. On the one hand, agrarian societies in China provided a motivation to achieve larger family sizes because of the way production was organized, as well as due to the tradition of patrilocal residence and patrilineality. High fertility with limited family divisions increased the family's chances

of forming an extended family and, thus, prolonging its existence. On the other hand, extended families implied both wealth and welfare, because only wealthy families could afford to support a relatively large number of people. When resources were limited and mortality was high, members of wealthy families (who enjoyed better living conditions and nutrition) enjoyed higher probabilities of experiencing a high level of fertility.

To explain how the extended family facilitates high fertility, Davis and Blake (1956) discussed two major mechanisms, namely, the promotion of early marriage and the provision of positive gains for extended families experiencing high levels of fertility. Firstly, the extended family encourages early marriage, and thus the motivation to marry is strong in an extended family. Provided that marriage does not imply a disintegration of the family, in the extended family the security of the older generations is not threatened by the marriage of the younger generations. Rather, the older generations control the property for the whole family, including their offspring. Since the marital bond is subordinate to the filial bond, when a wife is brought into a family, the elder's authority is extended and the household's human resources are enhanced. Parents also enjoy an advantage from arranging early marriages for their children, and especially for daughters, within a system of patrilocal residence because younger females are more sexually attractive and adaptable, and they have greater potential fertility. Secondly, in the extended family the cost of rearing children is relatively low, while the benefit is considerable. When kinship structure is dominant within an extended family, the cost and effort of rearing children are both borne by the whole extended family rather than only by the parents of the children. As a result, both men and women are motivated to

have more children that will, in return, increase their own level within the family authority system and thus extend their power. This practice is essential especially for newly married wives. The unhappy position of the daughter-in-law has been widely recognized in traditional Chinese societies. As a woman, a stranger, and a subordinate generation, being a daughter-in-law is disadvantageous when co-residing with parents-in-law and other relatives (Freedman 1961a). Giving birth to a child, especially a male, is an effective way to protect a newly married wife's position and to increase her power within a large family, since after the birth of a son, she might enjoy some bargaining power with other family members in higher levels of authority. Correspondingly, the religious and ethical values favoring such living arrangements and high fertility developed to ensure that the practice of giving birth that was promoted by the extended family functioned properly (Davis 1955).

Another explanation was developed by Stycos (1958). He agreed with the argument that in kinship-dominated societies, high fertility was psychologically, socially, and economically functional. But he also pointed out that the extended family, such as families in societies with patrilineal descent and patrilocal residence, was stable, while the nuclear family was not, because a partner could disappear after a pregnancy. This explanation has some theoretical potential, but it does not provide any truly significant insights into the relationship between the concept of the extended family and the promotion of fertility.

Burch and Gendell summarized several classic interpretations, noting that "extended family systems tend to motivate and support early and near-universal

marriage and high marital fertility, and thus high levels of societal fertility" (Burch and Gendell 1970: 227). Conversely, Cain (1982) suggested a possible mechanism through which the extended family might facilitate fertility decline. According to him, the immediate lateral kin (brothers, cousins, uncles) must be distinguished from the immediate lineal kin (fathers, sons, grandsons), with regards to the provision of insurance. Once the lateral bonds become weaker, as reflected by the change from the extended family to the nuclear family, individuals tend to be more dependent on the lineal kin that can only be achieved through reproduction. However, if sufficient support from the lateral kin is available, families do not have to have high fertility to achieve that purpose. To further clarify this notion, he gave as an example, the Chinese population:

> …the enduring economic solidarity of the extended family among Chinese population has facilitated fertility decline by diffusing risk and preventing children from becoming the focal point of parental security concerns. (P. 173)

This argument is interesting and inspiring when applied to contemporary China. As fertility declines, the lateral bonds diminish quickly, especially for single children. What can be inferred from Cain's argument is that families in contemporary China should value their children more than families in the historical China. Owing to the fact that parents might not be able now to have as many children as they may want, and that co-residence with relatives to higher degrees has become quite rare and impractical, parents should now be more likely to make significant investments in their children. A further inference might be that young couples also are likely to be pushed by their parents into having children, because not only the young couples, but also their parents, may eventually become dependent on the next generation.

Even though most theoretical discussions of the effects of extended family on fertility have focused on preindustrial societies, extended families can be compatible with industrial societies. Due to industrialization and modernization, accompanied by the enormous influence of individualism, family structure within developed industrial societies is largely characterized by the nuclear family and other more complicated family forms, such as the single-parent family and the stepfamily. There is no doubt that, in industrialized societies, the main economic, political, educational, and social service functions tend to shift away from the family to other specialized institutions (Freedman 1961b; Ryder 1983). However, even in Western societies an extended family could be a viable choice, if not even a preference, under specific circumstances. Litwak (1960a; 1960b) showed that modern transportation has made it possible to maintain a large extended family, even if family members have to commute long distances to reach their respective jobs. Angel and Tienda (1982) attributed the prevalence of the extended family in minority groups in the U.S. to both cultural influences and financial disadvantages. Moreover, a close examination of kinship relationships suggests a new form of family structure, the modified extended family, which is characterized by the geographic propinquity of nuclear families bound together by kinship. This kind of family adapts to industrial societies by facilitating kin support, but does not require a rigid hierarchical authority structure. In modified extended families, financial assistance is still most likely to flow from parents to young, married children, especially during their early years of married life, as such as the time for marriage and childbearing (Sussman and Burchinal 1962). In general, the discussion of extended families and

fertility in industrialized societies is very limited, but the research does suggest that the prevalence of the nuclear family alone is not sufficient to guarantee a fertility decline (Stycos 1958).

Comparing preindustrial societies with industrial societies at an aggregate level is a popular way to examine the effects of family structure on fertility, because these two different types of societies typically have different fertility levels, as well as quite different family structures. On the other hand, comparing the fertility levels of women in extended families with those of women in nuclear families is a more straightforward method of understand the effects of family structure on fertility, within a particular context. Burch and Gendell (1970) have concluded that although the theoretical discussion frequently resides at the aggregate level, such explanations also have implications at the individual level. Burch and Gendell state the following:

> Davis (1955), for instance, discusses the institutional patterns favoring high fertility in order to explain why the societal fertility level in agrarian societies has continued to remain high, even though substantial declines in mortality have occurred in many such countries. At the same time, his explanation-that the subordination of the nuclear unit to larger kinship structures, often in a joint household, encourages having many children-implies that wives in neolocal nuclear units will have lower fertility than wives in nuclear units living in joint households. (P. 230)

Next, I will review the empirical findings regarding the effects of family structure on fertility, most of which are individual-level analyses.

2.3.2. Empirical Findings

Comparing Eastern societies with Western societies, it is not surprising that recent studies of the extended family have concentrated on families of the East. As

discussed earlier, in spite of a generally decreasing family size, the traditional family structure of extended family and patrilocal residence have been well preserved in contemporary China. However, the advantage offered by the extended family for organizing production no longer exists. As Mason noted, "although three-generation households may have remained relatively common, relations of authority and obligation, which are what drive fertility in Caldwell's theory, are likely to have changed considerably" (Mason 1997: 444). Now, both traditional values and limited resources play important roles in the continued formation of the extended family. Ironically, these two motivations result in different fertility scenarios. In the first scenario, a married couple co-resides with the husband's parents because the man and woman believe it is the best way to comply with Chinese tradition, and they believe it is their responsibility to perform in this way. In accordance with this situation, the extended family is very like to be associated with higher fertility and a high son preference. In the other scenario, in which a married woman stays at her parents-in-law's house due to the limited availability of housing or the necessity of taking care of the elderly, the new wife may want to limit fertility or postpone births in order to avoid a decrease in the family's standard of living. In those situations where the older generation may have a strong preference for a larger family and be willing to provide childcare service and financial support, however, the young couple may be convinced to pursue a higher level of fertility. In other words, the various considerations involved in making the decision to co-reside with parents make it difficult to generate a single theoretical pattern regarding the effects of family structure on fertility in contemporary China. The results from co-

residence, in terms of fertility, significantly depend upon a negotiation of these motivations with other impeditive factors.

Many of the current studies of family structure and fertility were inspired by Lorimer and Davis' work, as well as by Burch and Gendell's extended family fertility hypothesis. Since family structure does not have as much control over the production and distribution of economic resources as it once did in many preindustrial countries, researchers have to be extremely careful when using this theory to understand fertility differentials among industrial countries. As a result, nearly all existing studies were conducted at the individual level, and within various social contexts.

Burch and Gendell (1970) found inconsistent findings in the research done before the 1970s. They mainly compared studies regarding the countries of India and Taiwan. The results of the India studies showed that women living in joint families had lower cumulative levels of fertility than those in simple families, a finding which was inconsistent with their theory. Although the authors of the India studies suggested an explanation, that women in joint households had intercourse less frequently due to a lack of privacy and the pressure of kin to obey cultural taboos involving intercourse, the inappropriate research methods and the small sample used in such studies were believed to be responsible for the biased results. On the other hand, Burch and Gendell found studies on Taiwan that indicated a consistent result, one in which living in a nuclear family was linked to lower fertility values.

Four recent quantitative studies have systematically examined the impact of family structure on fertility in selected East Asian countries. Morgan and Hirosima

(1983) found that in Japan, wives in extended families tended to desire more children compared with those in nuclear families, controlling for their current parity. Studies of Taiwan and China provided further evidence in support of this argument. One recent study of Taiwan concluded that the relationship between family structure and fertility was consistent with the theoretical discussion predicted during a twenty-year period (from 1965 to 1985) at both the macro and micro levels, with respect to descriptive statistics (Weinstein et al. 1990). A second study of Taiwan, by Chi and Hsin (1996), confirmed that experience in an extended family tended to exert an upward pressure on marital fertility, even if the period of co-residence was short. Finally, Chen's study examined the effects of extended family in China in the 1990s. She showed that patrilocal residence was associated with higher fertility and a more rapid transition from marriage to first birth (Chen 2006). All of these studies show the significant effects of different types of family structure, and they pay special attention to patrilocal residence, an understandable emphasis given the importance of Confucianism in the cultures of East Asia. These findings suggest that at least in China, living with a husband's parents is associated with higher fertility among married women. Also, the lack of an effect of matrilocal residence suggests that culture and other ideological factors are also important.

Beyond these quantitative studies, qualitative research has also contributed to our understanding of these mechanisms. For example, based on interviews with nine focus groups in Ogu, Southwestern Nigeria, Wusu and Isiugo-Abanihe's research (2006)

demonstrated that a transition from an extended family to a nuclear family tends to lead to an erosion of certain traditional childrearing practices, resulting in fertility decline.

2.3.3 Methodology

As Ryder (1976) pointed out, the use of static typologies to define the relationship between fertility and family structure is often inappropriate because of the dynamic nature of family structure and post-marital residence practices. Qualitative studies can employ different strategies to explore this dynamic process, but quantitative studies require longitudinal data (Burch 1970).

The most frequent mistake is relating cumulative fertility to the current family structure. For instance, Karim (1974) and Loy (1981) used cross-sectional data to investigate the relationship between family structure and fertility in Pakistan and Malaysia, respectively. By linking the achieved fertility to the current family structure, they attributed each birth to a family structure that may have been formed after that birth. As a result, the first study showed that the effect of family structure on fertility was not significant in Pakistan. Similarly, the second study concluded that in urban Malaysia, nuclear families tended to have larger numbers of children, and family structure was not related to expected fertility. Without taking the sequence of childbearing and household formation into consideration, i.e., the issue of simultaneous bias, their conclusions were very likely misinterpretations of the relationships between family structure and fertility.

Another mistake often occurs when studies relate cumulative fertility to initial family structure. According to Ryder (1976):

> A much more accurate method for calculating the level of fertility, as affected by family structure, is to attribute each birth to the form of family structure in which the mother resided at either the time of conception or parturition. (P. 95)

If longitudinal data are not available, there are still alternatives to handle the problem caused by cross-sectional data. For example, rather than attribute the achieved number of children to the current family structure, Morgan and Hirosima (1983) asked how the current family structure may have influenced the woman's intent to have another child in the future. By doing so, these researchers avoided making inferences about the causal relationship between achieved fertility and current family structure, a relationship which remains uncertain. Weinstein and her colleagues (1990) endeavored to resolve this problem by asking "questions on whether the parents and married siblings of the husband or wife were alive when the couple married and at the time of the interview, and whether the couple had lived together with such relatives at marriage, or since then and for how long" (p. 219). This strategy opened the door to collecting retrospective information, which provided these researchers a way to reconstruct the longitudinal data. Therefore, although the data used in this study were collected directly from a cross-sectional survey, the authors managed to obtain information about dynamic changes in family structure. Both of the most recent studies in Taiwan and China took advantage of longitudinal data and Cox proportional hazard models, which were effectively used to capture changes in family structure (a more appropriate strategy for investigating the relationship between family structure and fertility) (Chen 2006; Chi and Hsin 1996).

2.4 Family Structure and Premarital Sex

2.4.1 Premarital Conception and Premarital Birth

In addition to the effects of family structure on marital fertility, I am also concerned in this dissertation with studying the effects of family structure on premarital sex. I will now review some of the relevant literature pertaining to this relationship. Generally speaking, the probability of premarital conception in China is believed to be much lower than that in Western countries, but an increasing trend of premarital conception has become evident over time. According to Wang and Yang (1996), premarital conception in China has increased from 0.015% of all pregnancies in the 1950s to about 3% in the late 1970s, to around 5% in the 1980s. A retrospective study using a national representative sample collected in 1997 suggested that approximately 3% of all ever-married women who had at least one birth experienced at least one premarital conception, which implies an even smaller proportion of premarital births among these women (Walther 2006).

Although premarital fertility among never-married women has not been fully investigated in China, evidence of increasing fertility among these women has been provided by studies examining related issues. First of all, an increase in premarital conception has been observed, especially in urban areas (Wu et al. 1992). Both accelerated sexual maturity and delayed marriage have contributed to an increase in the sexual activity of never-married women (Wang and Yang 1996), which will frequently result in premarital conception if no effective contraceptive method is used. Since premarital birth is not welcome in most cases, one of two strategies is usually applied

once premarital conception occurs. On the one hand, plans for marriage may be cemented and/or accelerated by premarital conception, even though the birth would take place after the marriage or at least be reported after the marriage, if the couple cannot manage to get married before the birth occurs. Otherwise, if women experiencing a premarital conception are not able to get married, they may choose to induce an abortion (Ma et al. 2008; Qian, Tang, and Garner 2004). In fact, the unwanted pregnancies of the never married account for nearly one quarter of the total of unwanted pregnancies, in some cities (Xiao et al. 1995). What makes the situation even worse was that the lack of general sex education and knowledge about contraception leads to repeat abortions among many never-married women (Cheng et al. 2004).

Unfortunately, because of the perceived notion of rare premarital fertility and the general sensitivity of questions regarding sexual activity and contraceptives, never-married women have regularly been excluded from official national surveys of fertility in China, even in light of the evidence of increased premarital sexual activity (Li and Newcomer 1996). However, given such a large never married but sexually active population, it does not make sense to continue to ignore the fertility behavior of this important group.

2.4.2 Premarital Sex: Proximate Determinant of Premarital Fertility

Instead of analyzing premarital fertility *per se*, in my dissertation I will utilize an alternative strategy that focuses on sexual activity, the key proximate determinant of fertility. Davis and Blake (1956) identified eleven factors such as age of entry into sexual unions and the frequency of coitus, as intermediate variables through which

cultural conditions affect fertility. Bongaarts (1978) simplified Davis and Blake's model by replacing the intercourse variables with the proportion of the population who are married. The underlying emphasis of the marriage factor in Bongaarts' model is sexual activity, because the term "marriage" is used to estimate all sexual unions. Almost thirty years ago, Rindfuss and Morgan (1983) described a quiet but profound sexual revolution in Asia. They attributed the increase in early marital conceptions to an increase in coital frequency. This finding confirmed the importance of sexual activity in fertility, at least to some extent. Therefore, examining the sexual activity of never-married women is a better strategy than examining premarital fertility directly, given the available data.

Before the 1990s, studies examining premarital sex in China were very rare. In addition to the lack of data, researchers deliberately avoided talking about this issue, partly due to pressures resulting from extremely strict and rigid family morality, as well as the predominant assumption that sexual activity was rarely practiced among the never married. In fact, virginity in China is more of a concern for women. As with the double standard presented by Reiss (1964), premarital sex is perceived in China as wrong for all women, but excusable for all men. Female virginity is so important for never-married women that the lack of it not only compromises their value on the marriage market, but the presence of it gives them more decisive power in the courtship relationship.

However, belief and reality often are far apart. The rate of premarital sex among never-married women in China has increased, although the existence of a double standard in sexual behavior is still observed (Parish, Laumann, and Mojola 2007). Before the 1990s, when premarital sex was generally punished by social sanctions, it

was reported that some never-married women were motivated to have sex not only to fulfill their partners' physical needs, but also to fulfill the needs of their partners' families as a way of reducing the "price of the bride," regardless of whether these never-married women themselves preferred to have sex before marriage (Zhou 1989). Since the 1990s, premarital sex has gained more and more attention, and this has been motivated by an increasing number of reports on the adverse results of engaging in premarital sex such as induced abortions of unwanted pregnancies and infections with sexually transmitted diseases. It has been observed that premarital sex has become increasingly morally acceptable among young people, and an increasing number of China's youth admit to having engaged in premarital sex (Bullough and Ruan 1994; Yan 2002; Zhang et al. 1999). Focusing on never-married college students and migrants, previous studies provide solid evidence of substantial changes in the attitudes and behaviors of Chinese youth with regards to premarital sex (Fan et al. 1995; Higgins and Sun 2007; Ma et al. 2006; Zheng et al. 2001). However, compared to Western countries, premarital sex is still perceived as unfavorable, if not prohibited, in China. It has been reported that Chinese young adults have less sexual knowledge, less open-minded attitudes, and are more conservative in sexual activity than young adults in other areas of the world, and this conservative attitude toward sex extends to Chinese born in Western countries as well as to Chinese college students who study in the West (Higgins et al. 2002; Huang and Uba 1992; Miller et al. 1997; Tang, Lai, and Chung 1997; Widmer, Treas, and Newcomb 1998; Yu 2007; Yu 2010).

2.4.3 Family Structure and Premarital Sex

2.4.3.1 Theoretical Considerations

Theoretical discussions and empirical studies of the effects of family structure on premarital sex and conception have tended to focus on the effects of single-parent families, since such families are prevalent in industrial Western societies. Wu and Martinson (1993) summarized three major theoretical explanations about the influence of family structure on premarital births. The first uses a socialization perspective, which states that parents convey their sexual attitudes and behaviors to their children in both direct and indirect ways, through their interactions with their children. These experiences in childhood continue to influence children's later behavior. For example, the negative effects of a role model, such as the absence of a father and presence of a single mother, may lead to early sexual activity and premarital births. The second explanation is rooted in the studies of adolescent deviance, which emphasize the importance of parental supervision and control over children's deviant behaviors. Theoretically, two-parent families practice greater supervision and control over their children than single-parent families. The first two explanations are distinguished as follows:

> An important distinction between the socialization and social control hypotheses is that the socialization hypothesis stresses the effect of prior experience on current behavior while the social control hypothesis stresses the effect of current family situation on current behavior. (Wu and Martinson 1993: 212)

The last theoretical consideration in Wu and Martinson's discussion focuses on the impact of a major disruption or change in the family environment, which is believed to cause major stress for children. A suddenly changed environment could lead children

to develop premature perceptions of sex, and result in parenthood as a way to escape unpleasant changes occurring in their own family. Pregnancy could then further push children out of their parents' homes, which in turn would increase the likelihood of these children being involved in aggressive actions.

2.4.3.2 Empirical Findings

Based on the theoretical explanations discussed above, Wu and his colleagues (1997) argued that the initial engagement in sexual activity is a key factor mediating the influence of family structure on premarital births. Empirical studies have consistently revealed that living with a single parent is related to a higher probability of having sexual intercourse in adolescence, the overall earlier onset of intercourse, and generally less contraceptive use (Flewelling and Bauman 1990; Miller 2002; Rossi 1997). In these studies, the measure of family structure was either a snapshot of how many parents were present in a family household at the time of the interview (Blum et al. 2000; Pearson and Muller 2006; Santelli et al. 2000), or was based on the degree of marital disruption of the parents (Flewelling and Bauman 1990; Wu and Martinson 1993; Wu and Thomson 2001). The negative effects of living with single parents have been widely observed in the West, but the single-parent family has never become a major family structure in China where premarital conception and divorce are much less popular (Dong, Wang, and Ollendick 2002; Walther 2006; Wang and Yang 1996).

Other than focusing on adolescents, some other empirical studies in China have concentrated on never-married young adults. The underlying assumption in China is that sexual activity is unacceptable in any situation, for both children and adolescents.

However, because of data limitations, these studies tended to choose certain specific groups of young adults, such as college students and young migrant workers, as their research subjects (Higgins and Sun 2007; Ma et al. 2008; Ma et al. 2006; Wang et al. 2007; Zheng et al. 2001). In contemporary China, most college students are required to live on campus except during official public holidays and school breaks. Young migrant workers are youth who leave their hometowns, and thus most do not live with their parents. Therefore, the effects of family structure have not been fully investigated in most previous studies of premarital sex in China.

However, the importance of family structure on premarital sex can easily be inferred from related research. First of all, premarital sex is a concern for parents with never-married children. Particularly, parents of never-married women tend to be eager to protect their young women from premarital sex and unwanted pregnancies (Cui, Li, and Gao 2001). For never-married women, their living with their parents is sometimes due to economic disadvantage, a condition which facilitates parental control and communication. For example, never-married young women who live with their parents are likely to be required not to spend the night at places other than their parents' homes. In addition, parents' strong opinions against premarital sex can effectively be delivered to their children through daily conversations, if those children live under the same roof as their parents. However, to my knowledge, there is no recent research looking at the direct impact of family structure on premarital sex in contemporary China.

In my dissertation I will endeavor to address some of the gaps in the current literature just reviewed by conducting an empirical analysis of fertility behavior in

contemporary China. I hope that this research will provide new insights into the existing theoretical discussions of the effects of family structure on women's fertility and sexual activity. In the next Chapter, I will formulate a number of hypotheses and discuss two separate sets of data and methods that I will use in my research.

CHAPTER III

HYPOTHESES, DATA, AND METHODS

In this chapter, I first present my two general research questions. I then elaborate on these questions and provide specific hypotheses following my review of the general research findings reviewed in the previous chapter. Next, I describe in detail the two major datasets used to test the proposed hypotheses. Finally, I discuss the two main statistical models that I will use to test the hypotheses.

3.1 Research Questions and Hypotheses

Theoretically, family structure has been discussed as an influential factor on women's fertility. However, evidence from empirical findings that support this theoretical statement has been limited to certain populations and within specific social contexts. Particularly, very few studies have focused on contemporary China. Additionally, many of the prior studies lack a solid theoretical foundation by which to explain and understand the effects of family structure on the premarital sex activity of young adults, rather than of adolescents. Empirical studies of this issue are largely absent. Consequently, I ask two major research questions in this dissertation. First, how does family structure influence marital fertility in contemporary China? Second, does family structure influence the attitudes and behavior of premarital sex in contemporary China?

Following these two general research questions, I will undertake two main analyses. The first focuses on the marital fertility of married women, and the second focuses on the premarital sex of never-married women. The measure of family structure and how it reflects the proper forms of the family structure for the two subgroups of women are specified in each analysis. For either group, co-residence with parents is a likely key determinant. In other words, it will be important for me to distinguish those women co-residing with their parents from other women. For married women, living with parents and living with parents-in-law are similar, although co-residence with both sets of parents at the same time is rare. To avoid potential contradictions in classifying family structure for married women, two separate measures of family structure are used to account for the possibility of co-residence with parents from both the husband's and the wife's sides. One measure will follow the principle of patrilocal residence, and the other one will follow the principle of matrilocal residence. In addition, within each measure, I also differentiate among women having their parents or parents-in-law as neighbors. This particular family structure is called quasi-coresidence (Zimmer and Korinek 2010). The underlying assumption is that having parents or parents-in-law as neighbors works similarly for married women as co-residence, at least in terms of most family functions.

The measure of family structure for never-married women is simpler. Co-residence with parents is differentiated from others as a major category. Since never-married young adults are required to, or at least tend to, live with their peers, never-

married women living in shared units with peers is also distinguished as a separate group. I discuss these measures of family structure in detail in Chapters 4 and 5.

After clarifying the definition and measurement of family structure, I elaborate upon these two analyses by testing the following two general hypotheses:

1. Co-residence with parents-in-law increases the fertility of married women.
2. Co-residence with parents decreases the risk of premarital sex of never-married young women.

Now, I will develop these two general hypotheses into several specific hypotheses:

1. Co-residence with parents-in-law increases the desired fertility of married women.
2. Quasi-coresidence with parents-in-law increases the desired fertility of married women.
3. Co-residence with parents does not influence married women's desired fertility.
4. Quasi-coresidence with parents does not influence married women's desired fertility.
5. Co-residence with parents-in-law increases the hazard of having first births among married women.
6. Quasi-coresidence with parents-in-law increases the hazard of having first births among married women.

7. Co-residence with parents does not influence the hazard of having first births among married women.
8. Quasi-coresidence with parents does not influence the hazard of having first births among married women.
9. Co-residence with parents-in-law increases the hazard of having second births among married women.
10. Quasi-coresidence with parents-in-law increases the hazard of having second births among married women.
11. Co-residence with parents does not influence the hazard of having second births among married women.
12. Quasi-coresidence with parents does not influence the hazard of having second births among married women.
13. Never-married women who co-reside with their parents have more conservative attitudes toward premarital sex than than those who do not co-reside with parents.
14. Never-married women who co-reside with their parents are less likely to have premarital sex than those who do not co-reside with parents.

3.2 Description of the Data

As previously stated, this dissertation is divided into two parts; one focuses on married women and the other focuses on never-married women. Considering the completeness and availability of the necessary data, data from two separate surveys were utilized in this dissertation: the China Health and Nutrition Survey (CHNS), and Chinese

Health and Family Life Survey (CHFLS). Detailed descriptions of these two surveys are as follows.

3.2.1 China Health and Nutrition Survey

My analysis of martial fertility of married women relies primarily on data from the China Health and Nutrition Survey, an international collaborative project that began in 1989 between the Carolina Population Center at the University of North Carolina at Chapel Hill and the National Institute of Nutrition and Food Safety at the Chinese Center for Disease Control and Prevention. As Popkin and his colleagues (2010) have discussed, the primary motivation for this survey was "to examine across space and time the ways economic and social change affected a range of health behaviors in a large country" (p. 1435). China was an appropriate country for this study, as it has the largest population in the world and has experienced a rapid socioeconomic transition. Since this survey was designed to examine the effects of the health, nutrition, and family planning policies and programs implemented by national and local governments, and to explore how the social and economic transformation of Chinese society affected the health and nutritional status of its population (Carolina Population Center n.d.), it collected multilevel data on various topics related to health and nutrition. Characteristics of individuals, households and communities were recorded simultaneously. The topics covered include socioeconomic status, health and nutrition status, time use and activities of daily life, family structure, care of children and the elderly. Particularly, this survey contains a section with in-depth information on marriage, pregnancy, and birth history, as well as inter-generational linkages to parents and parents-in-law of ever-married

women under the age of 52 (except for the first wave, in which only ever-married women under 50 provided this information). To be more specific, this section records the date of marriage, the results of pregnancy, the date and sex of each birth, and the living arrangements of parents or parents-in-law for every ever-married female participant. Additionally, individuals' demographic and socioeconomic status variables can be found in the household survey section, which uses a household roster as a reference for subsequent blocks of questions on time allocation at home and economic activities.

The main strength of this survey is that it provides longitudinal data every few years, which is key for capturing changes at an individual level over time. The first round of the survey was administered in 1989. The respondent pool largely has been sustained in the following survey rounds completed in 1991, 1993, 1997, 2000, 2004, 2006, 2009, and 2011. As Popkin and his colleagues (2010) have noted, the response rates based on those who participated in the previous survey round remaining in the current survey were around 88% at the individual level and 90% at the household level. As a consequence, this survey provides an opportunity to investigate changes at the individual level, given that the same respondent would have been included in two or more survey rounds. In addition, every survey round contains almost the same interview questions for each key section, though the same section may have been put in different questionnaires at different survey rounds. Therefore, the data obtained from each round for the same respondent are comparable. What makes these longitudinal data more valuable, especially when drawing information from succeeding survey rounds, is that it is possible to avoid a potential logical fallacy that can happen when investigating causal

relationships. In the literature review I discussed this issue of simultaneity bias; it would occur in analyses of the relationships between family structure and fertility based on cross-sectional data; this bias could likely lead to misinterpretations. For example, family structure does not necessarily contribute to the achieved fertility at the time of interview. On the contrary, it may be that the achieved fertility causes the formation of the current family structure. Hence, the causal relationship between family structure and fertility recorded in cross-sectional data is uncertain. Therefore, longitudinal data are required to support any attribution of births to the family structure in which the mother resides at the time of and prior to conception.

Another strength of this survey relies on its "ability to capture enormous heterogeneity and change spatially and temporally in one of the most rapidly changing environments in the world" (Popkin et al. 2010: 1439). As of the date of the writing of this dissertation chapter, the survey has been conducted for over twenty years and the average interval of time between the offerings of this survey is about three years. Clearly, this survey provides updated data more frequently than many other reliable resources such as population censuses.

Additionally, the survey covers wide geographic locales within China (See Figure 3.1). The study population is drawn from nine provinces—Heilongjiang, Liaoning, Shandong, Henan, Jiangsu, Hubei, Hunan, Guizhou, and Guangxi (from north to south). The sample is diverse, with variations in a wide range of demographic measures and socioeconomic statuses, as well as other related health and nutrition issues (See Table 3.1).

Figure 3.1 Map of CHNS Sampled Provinces

Source: Carolina Population Center. China Health and Nutrition Survey. http://www.cpc.unc.edu/projects/china/proj_desc/chinamap

Table 3.1 Demographic and Socioeconomic Development Indicators for China and Selected CHNS Survey Provinces, 2000

	Total Population	Population in Family Household	Mean Family Household Size	Total Fertility Rate	Sex Ratio at Birth	Illiterate Rate	GDP per Capita	Life Expectancy	Infant Mortality Rate
China	**1,242,612,226**	**1,178,271,219**	**3.46**	**1.22**	**120**	**9.08**	**7086**	**71.40**	**28.41**
Province									
Liaoning	41,824,412	40,597,750	3.16	0.98	112	5.79	11,226	73.34	11.16
Heilongjiang	36,237,576	35,457,466	3.24	0.88	108	6.33	8,562	72.37	10.96
Jiangsu	73,043,577	69,372,929	3.25	0.97	120	7.88	11,773	73.91	14.53
Shandong	89,971,789	85,995,937	3.22	1.16	113	10.75	9,555	73.92	15.11
Henan	91,236,854	89,285,110	3.68	1.44	130	7.91	5,444	71.54	23.18
Hubei	59,508,870	55,178,797	3.53	1.06	128	9.31	7,188	71.08	19.58
Hunan	63,274,173	61,061,446	3.46	1.27	127	5.99	5,639	70.66	28.48
Guangxi	43,854,538	42,480,672	3.76	1.54	129	5.30	4,319	71.29	31.10
Guizhou	35,247,695	34,591,772	3.74	2.19	105	19.85	2,662	65.96	66.05

Source: China Census, 2000; China Statistical Yearbook, 2001

One weakness of the CHNS survey is the lack of sampling weights, because the first round survey failed to create a provincial representative sample. After selecting participating provinces (which did not adequately represent the whole country), a multistage, and random cluster process was used to draw the sample in each selected province. Detailed information regarding sampling has been discussed by Popkin and his colleagues (2010):

> Counties and cities in each province were stratified by income (low, middle and high) and a weighted sampling scheme was used to randomly select four counties and two cities in each province. Villages and townships within the counties and urban and suburban neighborhoods within the cities were selected randomly. In each community, 20 households were randomly selected and all household members were interviewed; only preschoolers and young adults aged 20–45 years were surveyed in 1989 due to constraints of funding. The current sample consists of 216 communities from nine provinces (Heilongjiang province was enrolled as a ninth province in 1997), comprising of 36 urban neighborhoods, 36 suburban neighborhoods, 36 towns and 108 villages. The household sample was 4020 in 1989 and 4467 in 2006. For individuals, it was 15927 in 1989 and 18764 in 2006. (P. 1436)

Even though this survey employs probability sampling methods during some stages, nonprobability sampling during other stages (especially in selecting provinces) has led to a nonrepresentative sample as a whole. As a consequence, studies using data from this survey are not fully useful for making inferences to all of China. However, in general, the strengths of this survey outweigh its weaknesses, and by far it provides the best data are available at the website http://www.cpc.unc.edu/projects/china/data, free of charge. Recently, the longitudinal data (known as the CHNS Longitudinal Master Files) were added. These datasets are valuable because they consolidate and standardize data from multiple survey years (Carolina Population Center n.d.). Variables required for this

research were located in different longitudinal datasets, but I was able to identify and link individual pieces of information across all datasets by matching the respondents' IDs. In particular, I will focus in this dissertation primarily on data relating to marriage, conception, and birth histories of ever-married women drawn from the longitudinal dataset made up of ever-married women. Other longitudinal datasets provide data regarding demographic and socioeconomic information. More information about the China Health and Nutrition Survey can be found at the website http://www.cpc.unc.edu/projects/china.

3.2.2 Chinese Health and Family Life Survey

The Chinese Health and Family Life Survey provides data for my second analysis, the analysis regarding the premarital sexual activities of never-married women. Similar to the CHNS, the CHFLS is an international collaborative project between the University of Chicago/NORC, Renmin University of China, Peking Union Medical College, and the University of North Carolina. The primary focus of this survey was sexual behavior in contemporary Chinese society. There are eighteen sections in this survey covering demography, socioeconomic status, health, attitudes toward marriage and sex, marital status, sex partners, sexual dysfunction, sexually transmitted diseases, sexual experience, and others. Interviews were conducted between 1999 and 2000 in 18 widely-dispersed provinces, including Liaoning, Heilongjiang, Jilin, Gansu, Inner Mongolia, Shaanxi, Hebei, Beijing, Tianjing, Henan, Shandong, Hunan, Anhui, Jiangsu, Zhejiang, Shanghai, Fujian, and Guangdong (see Figure 3.2 and Table 3.2). With a response rate of 76%, the final sample included 3,821 individuals.

Figure 3.2 Map of CHFLS Sampled Provinces

Sources: Population Research Center, the University of Chicago. Chinese Health and Family Life Survey. http://www.src.uchicago.edu/datalib/DLproj/results/joc30372f1.gif

Table 3.2 Demographic and Socioeconomic Development Indicators for China and Selected CHFLS Survey Provinces, 2000

	Total Population	Population in Family Household	Mean Family Household Size	Total Fertility Rate	Sex Ratio at Birth	Illiterate Rate	GDP per Capita	Life Expectancy	Infant Mortality Rate
China	**1,242,612,226**	**1,178,271,219**	**3.46**	**1.22**	**119.92**	**9.08**	**7086**	**71.40**	**28.41**
Province									
Beijing	13,569,194	11,922,945	2.91	0.67	114.58	4.93	22460	76.10	3.80
Tianjing	9,848,731	9,218,220	3.10	0.88	112.97	6.47	17993	74.91	4.44
Hebei	66,684,419	64,296,922	3.59	1.29	118.46	8.59	7663	72.54	18.19
Inner Mongolia	23,323,347	22,618,741	3.33	1.09	108.48	11.59	5872	69.87	32.06
Liaoning	41,824,412	40,597,750	3.16	0.98	112.17	5.79	11226	73.34	11.16
Jilin	26,802,191	26,076,948	3.32	0.84	109.87	5.74	6847	73.10	17.98
Heilongjiang	36,237,576	35,457,466	3.24	0.88	107.52	6.33	8562	72.37	10.96
Shanghai	16,407,734	14,787,225	2.79	0.68	115.51	6.21	34547	78.14	4.40
Jiangsu	73,043,577	69,372,929	3.25	0.97	120.19	7.88	11773	73.91	14.53
Zhejiang	45,930,651	42,437,464	3.00	1.04	113.11	8.55	13461	74.70	11.93
Anhui	58,999,948	57,683,856	3.54	1.33	130.76	13.43	4867	71.85	33.47
Fujian	34,097,947	31,251,540	3.57	1.03	120.26	9.68	11601	72.55	21.77
Shandong	89,971,789	85,995,937	3.22	1.16	113.49	10.75	9555	73.92	15.11
Henan	91,236,854	89,285,110	3.68	1.44	130.30	7.91	5444	71.54	23.18
Hunan	63,274,173	61,061,446	3.46	1.27	126.92	5.99	5639	70.66	28.48
Guangdong	85,225,007	69,739,958	3.72	0.94	137.76	5.17	12885	73.27	17.16
Shaanxi	35,365,072	33,687,093	3.57	1.13	125.15	9.82	4549	70.07	33.04
Gansu	25,124,282	24,261,648	3.99	1.32	119.35	19.68	3838	67.47	52.98

Source: China Statistical Yearbook, 2001

The data collected by the CHFLS, a cross-sectional survey, had several advantages that facilitated my analysis of the effects of family structure on premarital sex. The first strength is that it generated a nationally representative sample. With the exclusion of Tibet and Hong Kong, the sample is nationally representative of the adult population aged 20 to 64 in China. This sample was drawn probabilistically in four steps, following standard procedures for complex samples. The specific sampling processes have been discussed by Parish and his colleagues (2003) as follows:

> First, using the 1990 national population census and public health reports of STD infection rates in different provinces and cities, China was divided into 14 strata based on size of urban population and location on the southern and eastern coasts (where STD infection rates have been reported to be high). To capture higher STDs in some regions, coastal regions and large cities were oversampled using known population weights. Second, 2 to 6 administrative units (urban districts, smaller cities, and counties) were selected from each stratum, with the probability of the unit being selected being proportional to the population of that unit. These provided 48 primary sampling units. Third, on arriving at a sampling unit, each survey team arrayed the subunits in the county or city by population size and again picked 1 to 2 subunits (neighborhoods in cities, villages or towns in counties) probabilistically, with more highly populated subunits having a greater probability of being selected. This produced a total of 60 sample communities. Fourth, using the official community registers of households and temporary migrants, the adult population aged 20 to 64 years was arrayed in order. Starting with a randomly chosen person from this list, individuals were picked at fixed intervals to produce approximately 83 individuals per community (5000/60 communities = 83). (P. 1266)

After collecting the data, analysis weights were applied and adjusted for sampling fractions and age distribution. The adjusted sample represents a population that closely parallels the population evidenced by the national census, as well as other national-level statistics for various demographic and socioeconomic attributes; thus, this adjusted sample can be considered a representative sample of all adults aged 20-64.

Stata's *svy* (survey) suite of commands will be employed in my analyses to adjust this sample for sample strata, primary sampling units, and population weights. Thus, it is reasonable to make inferences regarding the population based on the estimates provided by this sample.

Validity and accuracy enhance the strength of this survey; especially, the survey benefits from the way the interviews were conducted. Anything related to personal sexual experience or activity could be considered potentially sensitive topics, especially in China. For the sake of privacy, this survey employed several techniques that ensured the quality of data and the response rate. According to Parish and colleagues (2003), all interviewers were conducted by experienced social workers and researchers aged 40 to 50, and all interviewers were assigned same sex respondents to ensure a proper flow of communication. Computerized interviews were conducted in private rooms rather than in respondents' homes, so respondents were not asked to answer interview questions in public or in front of interviewers. All measures endeavored to encourage respondents to respond to interview questions, and more importantly, to tell the truth in their responses. Even though many items covered in the questionnaire were of an intimate nature, it is reasonable to believe that the data collected in this survey are reliable.

Unlike the CHNS, the CHFLS was a cross-sectional survey designed to collected data at a specific point in time. Due to the survey design, respondents gave their answers based on their attributes or experiences at the time of the interview. Accordingly, any information regarding what happened after the interview is not provided. Therefore, researchers need to justify any statements concerning causal relationships.

One dataset containing all variables derived from this survey is available on the website http://popcenter.uchicago.edu/data/chfls.shtml, free of charge. My analysis of the effects of family structure on rate of premarital sex will depend heavily on data from the following sections: demographics of the respondents, attitudes toward marriage and sex, and marital status. Additionally, only the never-married female respondents in this survey were considered. More information about the China Health and Family Life Survey can be found on the website http://popcenter.uchicago.edu/data/chfls.shtml.

3.3 Methods

The purpose of this dissertation is to examine the effects of family structure on fertility and sexual activity in contemporary Chinese society. As has been previously discussed, this will be done in two separate analyses: one of married women, and one of never-married women. Both are quantitative analyses based on the data discussed above. Given this purpose and the limits of the data, I employ two statistical models in the data analyses: the logistic regression model and the Cox proportional hazards model (hitherto and henceforth referred to simply as the "Cox proportional hazards model"). In the following section, I briefly introduce and discuss these two statistical models.

3.3.1 Logistic Regression Model

In this research, when an analysis involves a binary outcome (for example, whether or not a married woman wants another child, or whether a never-married woman has a conservative or liberal attitude towards premarital sex), I rely on logistic regression model.

Regression methods are the most important component of quantitative analysis in social science. They are used to capture and explain the relationships between a dependent variable and one or more independent variables. While the linear regression model is an effective way to examine the relationship between two or more variables, a failure to satisfy linear regression assumptions is common. Many assumptions for a linear regression model are easily violated when the dependent variable is dichotomous. For example, for the linear regression model, the dependent variable must be continuous, unbounded, and measured on an interval or ratio level. Violation of the measurement of the dependent variable will further cause violations of other assumptions for linear regression, including linearity, homoscedasticity, normal distribution of errors, and no relationship between the error term and the independent variables (Menard 2002).

If the dependent variable is dichotomous, a logistic regression model is more suitable. In a logistic regression model, the numerical value of the dependent variable is arbitrary, usually 1 and 0, representing whether or not a particular event occurs, where "yes" equals 1. Thus the numerical value of the variable is not remarkable. What is intrinsically interesting is whether and how this variable can be predicted by independent variables. First, we need to address the nonlinear relationship between the dichotomous variable and any independent variables. Since the dependent variable can have only two possible outcomes, it is impossible that a change in any independent variable will always cause a change in a dependent variable at a constant rate. In addition, even if we interpret the change in the dependent variable as a probability of the occurrence of a particular event, for an independent variable with extreme values, a slight change in the

probability of occurrence should be associated with any further changes in that independent variable. In order to account for this nonlinear relationship between a dichotomous dependent variable and any continuous variables, the nonlinear transformations of the dependent variable are employed to develop the logistic regression model as a nonlinear probability model (Long and Freese 2001; Menard 2002). After transformation of this probability, the logistic regression model can be denoted as follows:

$$ln\left(\frac{p}{1-p}\right) = a + b_1X_1 + b_2X_2 + \cdots + b_nX_n$$

where

p = the probability that the dependent variable takes a value of 1; and

X = the independent variable.

The above equation now expresses a linear relationship between the left part and the independent variables. In particular,

$p/(1-p)$ is defined as the odds of having the value of 1 for the dependent variable; and

$ln\left(\frac{p}{1-p}\right)$ is defined as the logit.

Instead of assuming a direct relationship between the dichotomous dependent variable and any independent variables, the logistic regression model assumes that the logit is a linear function of the independent variables. Every dependent variable that has a dichotomous attribute can be thought of in this way. Other than the ordinary least square method, maximum likelihood (ML) techniques generally are used to obtain the

best parameters for the logistic regression model, based on simple random samples (Menard 2002). As Long and Freese (2001) have noted, "ML estimates are the values of the parameters that have the greatest likelihood (i.e., the *maximum likelihood*) of generating the observed sample of data if the assumptions of the model are true" (pp. 63-64).

If data from a complex sample survey design such as the CHFLS are used to construct a logistic regression model, the ML estimation is no longer an ideal method because a complex sample survey design easily violates the assumptions of the ML estimation procedures. In a complex sample survey, observations are neither selected with equal probability, nor independent from each other. Therefore, the traditional standard errors will be replaced with robust standard errors, providing more accurate estimates and hypothesis testing results (Long and Freese 2001). While different approaches are available to estimate a logistic regression equation for complex sample survey data, the pseudo-maximum likelihood estimation is the standard method for logistic regression in the major software systems supporting analyses using complex sample survey data (Heeringa, West, and Berglund 2010). As mentioned above, *svy* commands in STATA facilitate this survey-design logistic regression analysis.

In logistic regression models, Wald tests are used to test whether or not each parameter is different from zero. In this research, an associated *P-value* equal to or less than 0.05 was selected to indicate a significant result (Heeringa, West, and Berglund 2010; Long and Freese 2001).

3.3.2 Diagnostics and Post-estimation Evaluation of Logistic Regression Model

Before fitting logistic regression models, I will use diagnostics to address one important assumption: that there is no multicollinearity among independent variables. I then use two post-estimation analysis methods to evaluate the fitted models. First, I use a method to assess the goodness of fit of a logistic regression model. Second, I test whether a logistic regression model adequately describes the data. Then, I provide a brief discussion of post-estimation evaluations and diagnostics for models based on complex survey designs.

Multicollinearity in the independent variables in a logistic regression model could potentially cause a problem in that the standard errors for logistic regression coefficients tend to be large. High levels of multicollinearity may result in large coefficients that are not statistically significant, coefficients with unexpected signs, or coefficients with unreasonably high values. Although there is no straightforward method to diagnose multicollinearity in a logistic regression model, it is possible to detect this problem by estimating a linear regression model "using the same dependent and independent variables that you are using in the logistic regression model" (Menard 2002). In STATA, the *vif* command after a linear regression model presents two measures, the variance inflation factor (VIF) and tolerance; either of which can be used to determine whether high multicollinearity exists. A tolerance value of 0.40 usually is employed as a rule of thumb. This suggests that 60% of the variance in a particular independent variable can be explained by all the other independent variables. VIF is the

inverse of tolerance. Thus any independent variable with a tolerance below 0.40, or a VIF above 2.5, indicates a potential problem and requires further examination.

Parallel to the *F* test for linear regression models, the likelihood ratio (LR) Chi-square test is used as a global test of the goodness of fit for logistic regression models by comparing the log likelihood from a full model to a model with no independent variables. The null hypothesis is that "all the effects of the independent variables are simultaneously equal to zero" (Long and Freese 2001). A small P-value for the LR test will lead to a rejection of the null hypothesis and a conclusion that the independent variables do provide better predictions. In STATA, the results of the LR test are included in the output table for the estimate of the logistic regression model. When cluster option or weight option is used to fit a logistic regression model, STATA reports the results of the Wald Chi-square test. As an alternative to the LR Chi-square test, the Wald Chi-square test is used to test the same null hypothesis that at least one of the independent variables' regression coefficients is not equal to zero in the model.

Similar to the R-square value in linear regression, McFadden's R-square is used as another measure of fit and presented as *Pseudo R2* in the STATA output for logistic regression models. It compares a full model with all independent variables to a model with no independent variables. Although it does not provide any straightforward interpretation similar to the "explained variance" interpretation expressed by the linear regression R square, it is an approximation for assessing predictive efficacy. A higher value of the McFadden's R square suggests more predictive efficacy in the logistic regression model. Similar to the linear regression R square, McFadden's R square

always increases as the number of independent variables increases. Therefore, an adjusted McFadden's R square should be used for a multivariate logistic regression model (Long and Freese 2001). However, as Heeringa and his colleagues (2010) have suggested, while this measure "may be used by the analyst to compare the fits of alternative models they should not be cited as measure of fit in scientific papers or reports" (p. 243).

To test whether a logistic regression model provides an adequate description of the data, one can use a specification test facilitated by the *linktest* command in STATA. The specific procedure was clarified by Vittinghoff and his colleagues (2005):

> This test involves fitting a second model, using the estimated right-hand side (i.e., the linear predictor) from the previously fitted model as a predictor. We would expect that the Wald test result for this predictor (labeled hat) to be statistically significant if the original model provided a reasonable fit. The model fit by linktest also includes the square of this predictor (labeled hatsq). The Wald test for inclusion of the latter variable is used to evaluate the hypothesis that the model is adequate; that is, the inclusion of the squared linear predictor should not improve prediction if the original model was adequate. Rejection indicates that the model is inadequate, and that an alternative binary regression model should be considered. It may also indicate that important predictors have been omitted. (PP. 192-193)

Although not all measures of post-estimation evaluation and diagnostics for logistic regression models based on complex survey design samples are provided routinely by statistical packages, researchers can rely on the following methods to conduct model evaluations and diagnostics: re-estimating logistic regression models by applying the sampling weights in the standard logistic regression program and carrying out model evaluations and diagnostics by treating the dataset as though it resulted from a

simple random sample (Heeringa, West, and Berglund 2010; Hosmer and Lemeshow 2000).

3.3.3 Event History Analysis and Cox Proportional Hazards Model

Event history analysis, also called survival analysis, is the major technique used in social science to investigate the occurrence of an event and its causes, at a specific point in time. For example, in my dissertation research there is a significant focus on the event of birth. Not only am I interested in whether a birth occurs, but also in the amount of time that passes from marriage to first birth. Without an event history analysis, "the attempt to apply standard methods can lead to severe bias or loss of information" (Allison 1984: 9). In the case of fertility, a linear regression model can only take into consideration those women who already have given birth. Thus, the model potentially introduces bias into any estimates because not all of the women subjects of this study had given birth at the time of the study. Logistic regression models can take all women into consideration, regardless of whether they have experienced a birth or not, but such models will fail to incorporate the information of age at the point of experiencing a birth. Event history analysis attempts to avoid these problems by taking both the pattern and correlates of the occurrences of the events, over time, into consideration. In an event history analysis, an "event" can be identified only if duration of nonoccurrence, defined as the risk period, exists in order for an occurrence to be recognized. Therefore, if we ask what the hazard of a first birth is after the experience of a marriage, it can be identified as an "event." The risk period, then, is the duration of time from the marriage to the first birth. Accordingly, the dependent variable in an event history analysis consists of two

parts. The first part reflects whether or not the event occurs, while the second part refers to the duration of time between the start of the risk period and the occurrence of the event or censoring.

The two main advantages of an event history analysis are as follows:

1) it is able to deal with censored observations; and
2) it is able to have both time-independent and time-varying explanatory variables.

In most situations, due to a limited observation period, censoring occurs when incomplete information is available regarding the duration of the risk period. Take the case of fertility as an example. There may be married women who have experienced no births, but who are still of childbearing age. It is impossible to determine whether and when they will give birth before they reach their late 40s, what we considered to be an upper limit for their fecundity, that is, their reproductive ability. In addition, some independent variables may not be constant over this perceived risk period. For instance, a woman's socioeconomic status may change through the course of her childbearing years. Event history analysis deals with both the censored cases and the time-varying variables. Thus, this method is particularly effective for longitudinal analyses which focus on changes over time.

Among the various event history analysis models, the Cox proportional hazards model is probably the most popular. As Allison (Allison 1984) has noted, "it is unequivocally the best all-around method for estimating regression models with continuous-time data" (p. 35). The Cox proportional hazards model is commonly

referred to as a proportional hazards model, based on its proportional-hazard assumption. It was first introduced by Cox (1972), and derived from "the incorporation of regression-like arguments into life-table analysis" (187). The Cox proportional hazards model can be written as:

$$\log h(t) = a(t) + b_1 X_1 + b_2 X_2 + \cdots + b_n X_n$$

where

h(t) = the continuous-time hazard;

a(t) = the function of time; and

X = the independent variable.

A major advantage of the Cox proportional hazards model is that the model assumes time dependence, but does not have to specify its form. According to Cleves and his colleagues (2010):

> The nice thing about this model is that $h_0(t)$, the baseline hazard, is given no particular parameterization and, in fact, can be left unestimated. The model makes no assumptions about the shape of the hazard over time—it could be constant, increasing, decreasing, increasing and then decreasing, decreasing and then increasing, or anything else you can imagine; what is assumed is that, whatever the general shape, it is the same for everyone. One subject's hazard is a multiplicative replica of another's… (P. 129)

A second advantage of the Cox proportional hazards model is that it allows for a stratified analysis. This is to say that the baseline hazards can differ by group without specifying their forms, but the coefficients are allowed to be the same (Cleves et al. 2010; Yamaguchi 1991). Therefore, the Cox proportional hazards model allows one to control for categorical variables, if necessary.

The two advantages discussed above make the Cox proportional hazards model exceptionally popular in social science research and data analysis. In my dissertation research, it will be used to examine the effects of family structure on the first two births experienced by married women. As an "event," each birth is related to two risk periods, the duration from marriage to a first birth, and the duration from a first birth to a second birth.

The significance test of each parameter in the Cox proportional hazards model parallels those described in the previous section for a logistic regression model. An estimate with a small *P-value* indicates the significant effect of the tested factor.

3.3.4 Diagnostics and Post-estimation Evaluation of Cox Proportional Hazards Model

Despite the regular diagnostic examination of multicollinearity (which I discussed in the previous section regarding logistic regression), I conducted two more specific model evaluations procedures to test my proportional hazards assumption and the overall model fit.

Though no assumption was made about the form of the baseline hazard in the Cox proportional hazards model, there is still one key assumption in the Cox proportional hazards model that pertains to proportional hazards. A formal test of the proportional hazards assumption is available in STATA by running the command *estat phtest*. This test is based on Schoenfeld residuals, and "is equivalent to testing that the log-hazard-ratio function is constant over time (Cleves et al. 2010: 207). In general, failure to reject the proportional hazards assumption is associated with P-values larger than 0.05.

The evaluation of the goodness of fit of the Cox proportional hazards model employs the Cox-Snell residuals. If the Cox proportional hazards model fits data well, "the Cox-Snell residuals should have a standard exponential distribution with hazard function equal to 1 for all t, and thus the cumulative hazard of the Cox-Snell residuals should be a straight 45° line" (Cleves et al. 2010:220). However, some variability should be expected in the right-hand tail, due to a reduced effective sample size. In my analyses, I present the line of the cumulative hazard of the Cox-Snell residuals, compared to a straight 45° line, to show how well the model fits the observed data.

In sum, my dissertation research asks two general questions: one is concerned with the marital fertility of married women, and the other is concerned with the premarital sexual activities of never-married women. These two general questions are then broken down into several specific hypotheses. Some of these hypotheses emphasize attitudes or desires, while others emphasize behavior. Using data from the China Health and Nutrition Survey and the Chinese Health and Family Life Survey, my quantitative analyses will estimate logistic regression models and a Cox proportional hazards models. Detailed information about the results of my analyses and their interpretations for each specific model is provided in the next two chapters.

CHAPTER IV

ANALYSIS OF FAMILY STRUCTURE AND MARITAL FERTILITY

In this chapter I analyze the effects of family structure on marital fertility using data from the China Health and Nutrition Survey. In general, it is hypothesized that patrilocal residence increases marital fertility, while matrilocal residence should not have any significant influence. I undertake three analyses focusing on marital fertility, namely, the desired fertility, the transition from marriage to first birth, and the transition from first to second birth. For each analysis, I first specify the hypotheses and describe the dataset, then discuss the conceptualization and operationalization of the variables. Then, I present and interpret the results from the statistical models.

4.1 The Effects of Family Structure on Desired Fertility

In this section, I examine how the current family structure influences married women's desired fertility. This cross-sectional analysis utilizes panel data without linking information across the different panels. The bivariate analysis of the association between family structure and desired fertility uses cross-tabulation and chi-square tests. Then I move to the multivariate analysis using logistic regression models.

4.1.1 Hypotheses

Desired fertility is a fairly good estimate of achieved fertility in countries where effective contraceptive methods are widely available. Desired fertility is highly associated with actual fertility because "a woman's response to questions about desired

fertility are believed to be heavily influenced by the woman's actual fertility" (Pritchett 1994: 7). Therefore, I feel confident in using the theoretical discussions in the literature about the effects of family structure on marital fertility to desired fertility. I propose four specific hypotheses, as follows:

1. Coresidence with parents-in-law increases the desired fertility of married women.
2. Quasi-residence with parents-in-law increases desired fertility among married women.
3. Coresidence with parents does not have any influence on married women's desired fertility.
4. Quasi-residence as neighbors does not have any influence on married women's desired fertility.

4.1.2 Dataset

To test these hypotheses, a subsample of respondents from the China Health and Nutrition Survey was selected. First, I selected only married women aged 15 to 44. Then, women who had not given birth by the time of the survey interviews were removed because their response rate for questions on desired fertility was extremely low, lower than 25%, in the two panels conducted in 2004 and 2006. Given the fact that first births are generally accepted and preferred among married couples in China (Feeney and Yu 1987), focusing on the higher birth orders provides more practical insights into the effects on marital fertility.

This analysis of the effects of family structure on desired fertility begins with a bivariate analysis using cross-tabulations and chi-square tests which reflect only the influence of family structure without taking the influences of the other factors into account. The bivariate analysis was applied to data from six panels collected in 1991, 1993, 1997, 2000, 2004 and 2006. I then estimated a series of multivariate logistic regression models, adding other influential factors into the analysis, step by step. The multivariate logistic regression models use data collected in 2006, particularly, because the 2006 panel was the most recent panel providing the necessary information. Again, no matter which subset of data was used in these analyses, only ever-married women of childbearing age with at least one birth were included.

4.1.3 Conceptualization and Operationalization

There are several similar but slightly different measures dealing with desired fertility, such as the ideal number of children, the desired number of children, and the wanted number of children (Pritchett 1994). Beyond these quantitative measures, another way to measure desired fertility is to ask the question whether or not a respondent wants more children given the level of fertility already achieved (DaVanzo 2003), a question which was included in the China Health and Nutrition Survey questionnaires. Therefore, desired fertility here is operationalized as an answer to the question of whether a woman wants more children. Specifically, the China Health and Nutrition Survey employs a series of questions designed to record desired fertility. These questions use slightly different wording according to a woman's marital status and pregnancy history. For instance, for female respondents who were pregnant at the time

of the survey, the question reads: “Do you want another child, in addition to the child you are expecting?” while for female respondents who were not pregnant, the question reads: “Do you either want a child or another child sometime?” The answer to these questions is either a “yes” or a “no.” Therefore, I coded a categorical variable with two categories reflecting a woman’s desire, and called this variable a “desire for more children.” A value of 0 meant that there was no desire for more children, and a value of 1 indicated a desire for more children. Although this variable fails to reflect the exact number of children a woman desires, it is a simple way to measure a woman’s desired fertility given her achieved fertility.

The major independent variable in this chapter is family structure. I follow the two most popular ways of distinguishing family structure types, with my attention focused primarily on the extended family and patrilocal residence. Specifically, I separated patrilocal residence from matrilocal residence. In other words, I focus here on the residential patterns of married women’s parents-in-law, on the one hand, and on the residential patterns of their own parents, on the other. These residential patterns of married women’s parents-in-law and their own parents were further divided into three different types including coresidence, quasi-coresidence, and others. Particularly, quasi-coresidence refers to living nearby, usually next door as neighbors. Quasi-coresidence maintains the main function of coresidence, while avoiding potential conflicts and, in most cases, improving privacy (Chen 2006; Ngin 1999; Zimmer and Korinek 2010).

As a result, I used two categorical variables to measure family structure. The first variable, “Residential Pattern of Parents-in-Law,” divided all families into three

categories based on the residential pattern of the wife's parents-in-law. Patrilocal residence refers to the co-residence with parents-in-law, and was coded as 1. Adjusted patrilocal residence means a Quasi-coresidence with parents-in-law, and was coded as 2. The third category captures all families not included in the first two categories, and was coded as 3. Similar to the first variable, the second variable, "Residential Pattern of Parents," divided all families into three categories according to the residential pattern of the wife's parents. Co-residence with parents results in matrilocal residence, and a value of 1. Adjusted matrilocal residence results from quasi-coresidence with parents, and a value of 2. The third category contains all the other families, and had a value of 3 (see Table 4.1). Since these two variables are categorical variables, the value for each category was arbitrary, indicating only a specific category with no numeric meaning.

Table 4.1 Operationalization of the Categorical Variables of Family Structure for the Married Women

	Residential Patterns of Parents-in-law	**Residential Patterns of Parents**
Co-residence	1 = patrilocal residence	1 = matrilocal residence
Quasi-coresidence	2 = adjusted patrilocal residence	2 = adjusted matrilocal residence
Others	3 = others	3 = others

Based on these two variables used to distinguish different family structures, I constructed two separate sets of models for all the analyses in this chapter; one was based on the residential pattern of married women's parents-in-law, and the other was based on the residential patterns of their parents. The major reason for the separate models was that residence of parents-in-law and residence of parents are independent

and compatible. Theoretically, married couples could co-reside with parents from both sides, although in practice this arrangement is not preferred. Since the categories in these two variables are not mutually exclusive, these two variables were never used simultaneously. In every model, either the residential patterns of parents-in-law or the residential patterns of parents were included, but not both. Not only does this practice avoid potential conflicts in classification, but it also allowed me to concentrate on the effects of some of the more important family structures, such as traditional patrilocal residence and matrilocal residence.

In the multivariate analyses, each categorical variable for family structure was recoded into two dummy variables, in order to correctly estimate the effects of each specific family structure. A dummy variable takes the values 1 or 0 to indicate a specific category. For example, I used the dummy variable for patrilocal residence and the dummy variable for adjusted patrilocal residence to record the family structures based on the residential patterns of wives' parents-in-law. Co-residence with parents-in-law was indicated by a value of 1 for the dummy variable of patrilocal residence, and a value of 0 for the dummy variable of adjusted patrilocal residence. All other family structures except patrilocal residence and adjusted patrilocal residence were indicated by values of 0 for both dummies, and this category was used as a reference in the multivariate analyses (see Table 4.2).

Besides the major independent variable of family structure, the logistic regression models also included other relevant influential factors as control variables. First, I added the married women's demographic characteristics into each analysis,

including their age and age at marriage (both of which were interval variables). Particularly, age refers to the age at which the women were interviewed. Age at marriage refers to the ages of the women at their most recent marriages.

Table 4.2 Operationalization of the Dummy Variables of Family Structure Based on the Residential Pattern of Married Women's Parents-in-Law

	Observed Family Structure		
Dummy Variables for Family Structure	Patrilocal residence	Adj. patrilocal residence	Others
Patrilocal residence	1	0	0
Adjusted patrilocal residence	0	1	0

Next, factors indicating socioeconomic status were added into the model, including nationality, place of residence, education, and income. Nationality is a categorical variable with two categories: Han, and others. A dummy variable of "Han" was used to record nationality, a numerical value of 1 was assigned for the Han nationality, and a 0 was assigned for all minority groups. The dummy variable "Urban" was used to reflect the place of residence, with a 1 indicating an urban area and a 0 indicating rural. There were four categories for education: primary school or less, middle school, high school, and college and above. Thus, three dummy variables were utilized in the logistic regression models, namely "Middle school," "High school," and "College," correspondingly. Values of 0 for these three variables indicated an education level of primary school or less. Income was measured as the "Logged household income per capita." Income was already an interval variable, and was thus log transformed; it is also adjusted for the consumer price index.

In addition to these demographic and socioeconomic characteristics, I also controlled for the number and sex of married women's children in the multivariate analyses. Obviously, the achieved number of children should have a strong influence on women's decisions regarding whether or not they desire more children in the future. Sex composition of the surviving children should also be a big concern, especially in societies with a strong preference for sons. To measure the effects of these two factors, I added two more variables: "Number of surviving daughters" and "Number of surviving sons." The combination of these two variables reflects married women's achieved number of children, as well as the sex composition of their children.

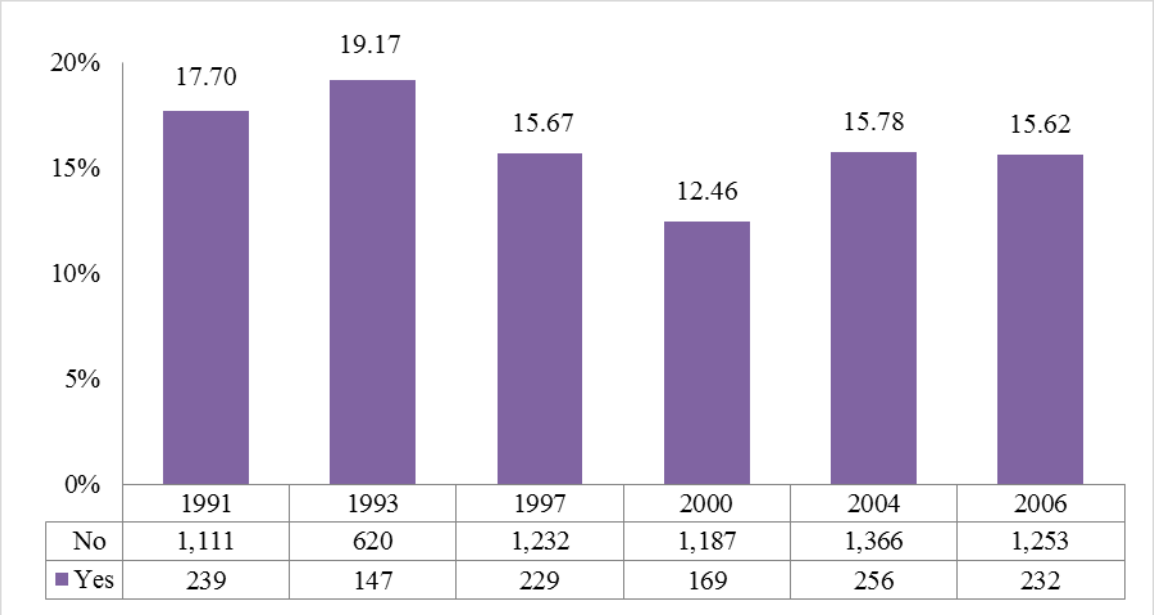
4.1.4 Bivariate Analysis

Data from the six panel surveys conducted in 1991, 1993, 1997, 2000, 2004 and 2006 provided 8,041 records from married female respondents of childbearing age, who had at least one child at the time they were surveyed. Since the China Health and Nutrition Survey is a longitudinal study, respondents could participate in multiple surveys. In other words, some women contributed their responses to this question in several waves. In this section, I utilized these data to investigate the bivariate relationship between family structure and desired fertility using a cross tabulation and a chi-square test. This analysis not only gave us a general idea of the effects of family structure on desired fertility, but also reflected changes to and trends in this relationship between 1991 and 2006 from a cross-sectional comparison.

In general, around 15% of selected married women said they wanted another child regardless of their achieved fertility, across these six panel data (see Figure 4.1).

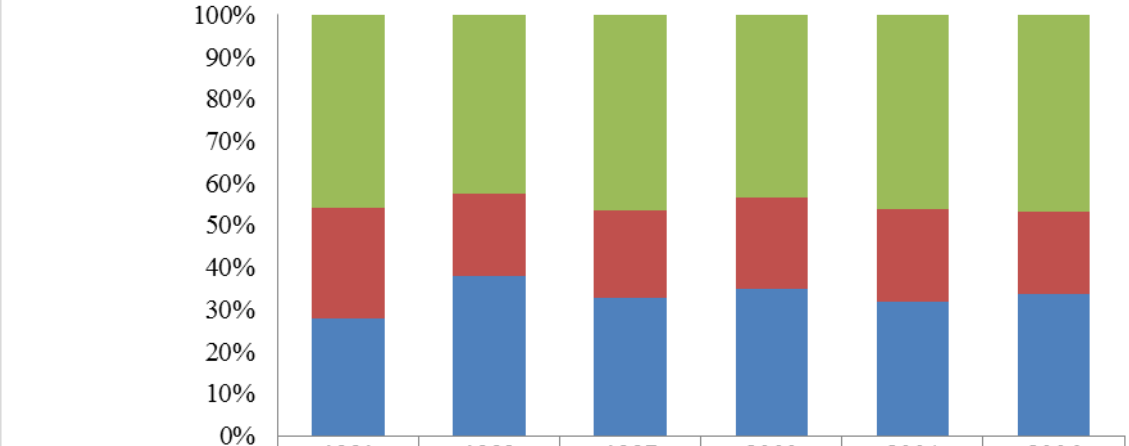
The family structures of selected women parallel the pattern for all married women. About 30% coresided with parents-in-law, and about 20% had parents-in-law as neighbors (see Figure 4.2). From a matrilocal residence perspective, no more than 10% claimed that they either had their own parents in the same household or had their parents as neighbors (see Figure 4.3). Clearly, patrilocal residence was much more popular than matrilocal residence.

Figure 4.1 Percent of Married Women Who Want another Child



Note: The numbers of observations are in the table

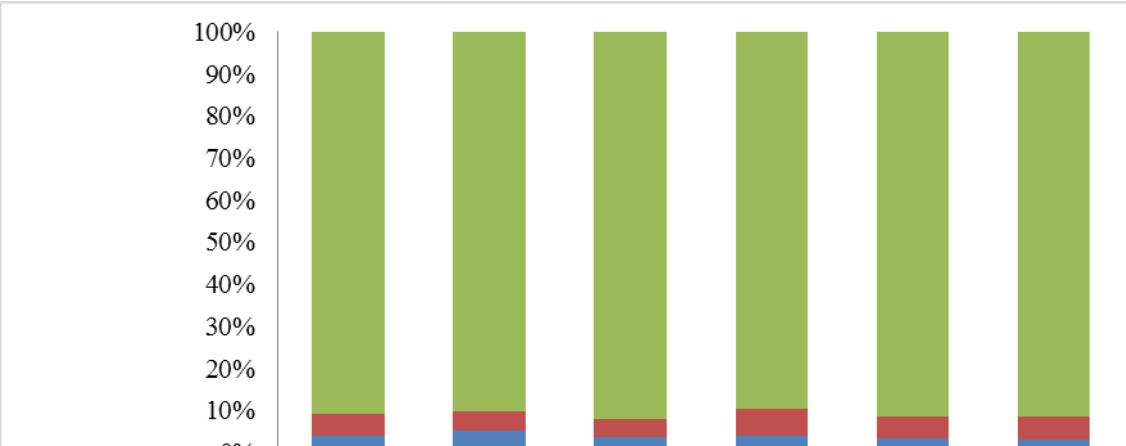
Figure 4.2 Residential Patterns of Parents-in-Law of Selected Married Women



	1991	1993	1997	2000	2004	2006
Others	619	325	681	588	748	694
Quasi-coresidence	355	151	301	294	356	288
Co-residence	375	291	478	472	517	500

Note: The numbers of observations are in the table

Figure 4.3 Residential Patterns of Parents of Selected Married Women



	1991	1993	1997	2000	2004	2006
Others	1,228	691	1,342	1,213	1,477	1,357
Quasi-coresidence	69	34	64	88	85	84
Co-residence	53	41	54	54	56	44

Note: The numbers of observations are in the table

First, I will concentrate on the effects of the residential pattern of parents-in-law. Table 4.3 shows the percent of selected women who wanted another child at the time of their survey interviews by the residential patterns of their parents-in-law. The chi-square test results indicated that residential patterns of parents-in-law had a significant association with the surveyed women's responses to the question of whether or not another child was desired. Compared to women who had parents-in-law as neighbors or other categories, co-residence with parents-in-law was significantly associated with a higher percent of women who wanted another child. In spite of small fluctuations, this general pattern was quite stable from 1991 to 2006 (see Figure 4.4). About 25% of women who lived with their parents-in-law in the same household wanted another child, while less than 15% of women in the other two family types responded that they wanted another child.

Table 4.3 Percent of Married Women Who Want another Child by the Residential Pattern of Married Women's Parents-in-Law

Residential Pattern of Parents-in-Law	1991	1993	1997	2000	2004	2006
Co-residence	29.07	27.84	24.69	21.61	27.27	24.6
Quasi-coresidence	15.21	13.91	12.29	8.84	10.67	13.54
Others	12.28	13.85	10.87	6.97	10.29	9.94
Chi-Square	47.23	22.75	43.86	55.90	75.25	48.59
P-Value	0.000	0.000	0.000	0.000	0.000	0.000
n	1,349	767	1,460	1,354	1,621	1,482

Figure 4.4 Percent of Married Women Who Want another Child by the Residential Pattern of Parents-in-Law

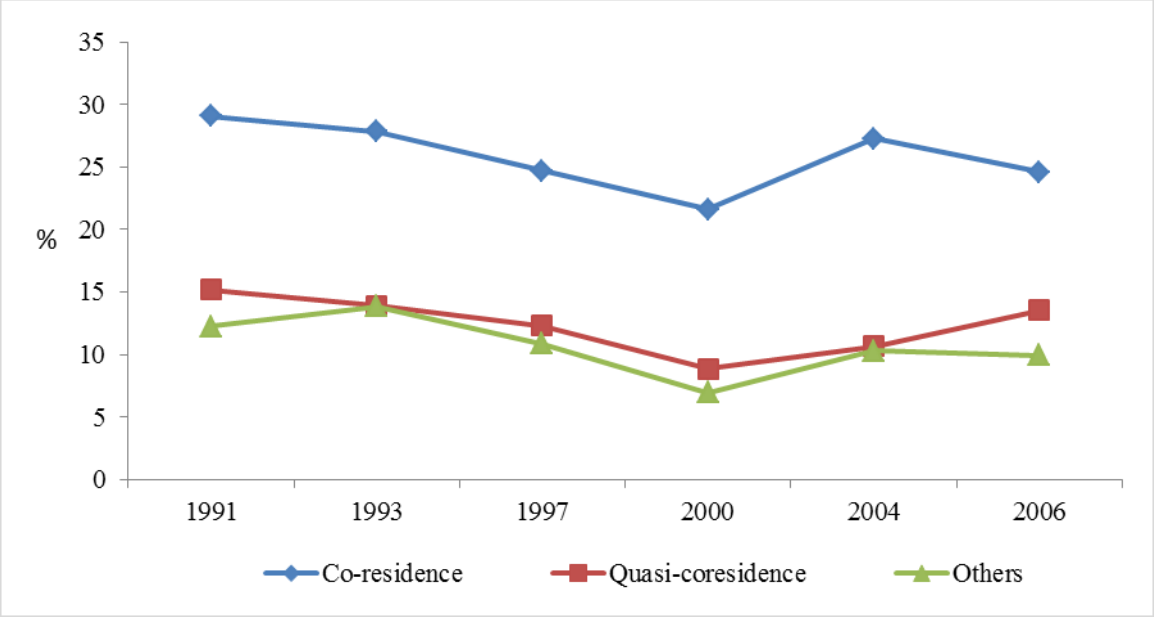
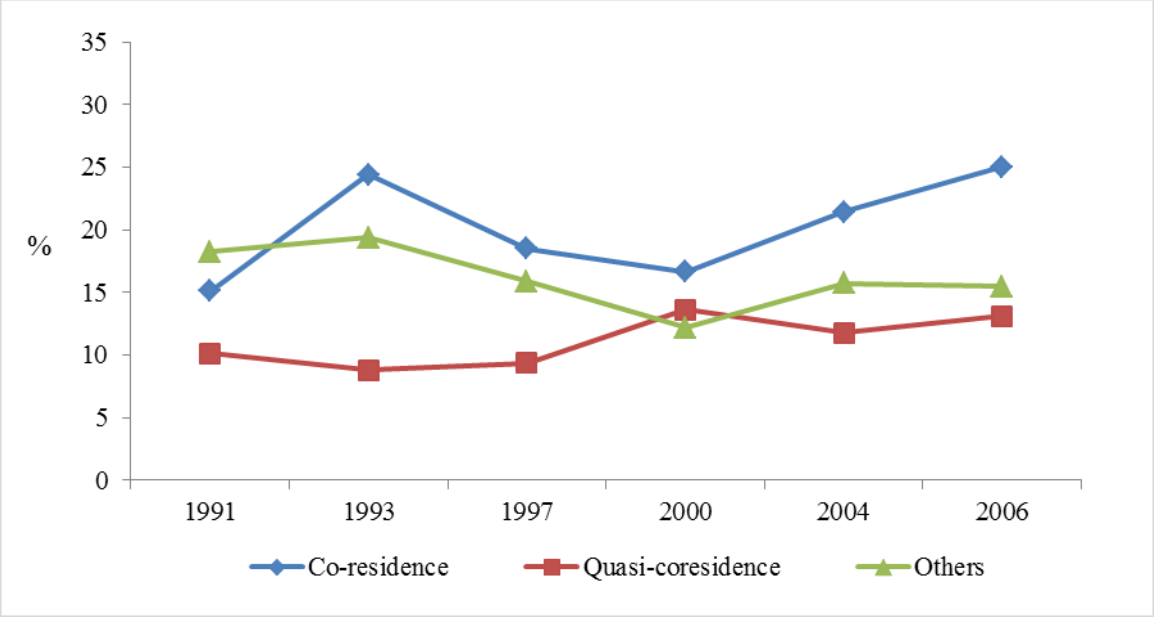


Figure 4.5 Percent of Married Women Who Want another Child by the Residential Pattern of Parents



Next, I investigated the effects of the residential patterns of the parents. Unlike the previously discussed analysis, it is more difficult to generalize the influence of the residential patterns of the married women's parents. No significant association between women's desired fertility and their parents' residential patterns was observed in the panel data, regardless of the interview years (see Table 4.4). It seems that from 1993 onward, married women who were living with their parents became more likely to want another child (see Figure 4.5). However, the difference is not statistically significant.

Table 4.4 Percent of Married Women Who Want another Child by the Residential Pattern of Married Women' Parents

Residential Pattern of Parents	1991	1993	1997	2000	2004	2006
Co-residence	15.09	24.39	18.52	16.67	21.43	25.00
Quasi-coresidence	10.14	8.82	9.38	13.64	11.76	13.10
Others	18.24	19.39	15.87	12.20	15.71	15.48
Chi-Square	3.20	3.09	2.29	1.06	2.38	3.36
P-Value	0.202	0.213	0.318	0.588	0.304	0.186
n	1,350	766	1,460	1,355	1,618	1,485

4.1.5 Results of Logistic Regression Models

Next, I quantified the effects of family structure, and also introduced other influential factors into my analysis by estimating multivariate logistic regression models. Since the retention rate for these panel surveys was nearly 90% (Popkin et al. 2010), and the results from the bivariate analysis already suggested similar patterns across the panels, the multivariate analysis focused on the most recent panel with the necessary

data, i.e., the data from the 2006 survey. Finally, 1,005 married women who had at least one birth in 2006 were included.

The dependent variable in the logistic models I estimated was desired fertility, measured as whether or not a woman wanted more children. The independent variables consisted of two types: the major independent variable (that is, family structure), and the other hypothetically influential factors as control variables.

Among the 1,005 women, 12.2% replied that they wanted to have one more child. Similar to my findings earlier, patrilocal residence still accounted for a sizable proportion. Approximately 27.8% of these married women lived with their parents-in-law in the same household, and 21.2% had parents-in-law as neighbors. In total, almost half of these married women's households could broadly be categorized as patrilocal residences. In contrast, matrilocal residences were very rare. Less than 3% of those surveyed reported coresidence with their parents, and only 6% had their parents as neighbors (see Table 4.5).

The descriptive statistics of the control variables for the selected 1,005 women are also shown in Table 4.5. The average age of the women in this sample was 37 years old, with a lowest age of 21 and a highest age of 45. On average, these women married at 23 years of age. Eighty seven percent were Han, while 13% were minorities. One fifth lived in urban areas. In general, education attainment was rather low. Only 17% graduated from high school and 5% obtained a college education. The average household income per capita was 5,271 RMB with a logged value of 8.57. On average, each woman had 0.71 female births and 0.85 male births.

Table 4.5 Descriptive Statistics for the Desired Fertility Models

Variables	Mean/ Proportion	Std. Dev.	Min	Max
Dependent Variable				
Want another child				
no (ref)				
yes	0.122	0.328	0.000	1.000
Independent Variables				
Residential Pattern of Parents-in-law				
others (ref)				
patrilocal residence	0.278	0.448	0.000	1.000
adj. patrilocal residence	0.212	0.409	0.000	1.000
Residential Pattern of Parents				
others (ref)				
matrilocal residence	0.028	0.165	0.000	1.000
adj. matrilocal residence	0.060	0.237	0.000	1.000
Control Variables				
Age	37.268	5.435	21.000	44.917
Age at marriage	22.613	3.051	13.833	41.417
Nationality				
others (ref)				
Han	0.866	0.341	0.000	1.000
Place of residence				
rural (ref)				
urban	0.199	0.399	0.000	1.000
Education				
primary school or below (ref)				
middle school	0.425	0.495	0.000	1.000
high school	0.169	0.375	0.000	1.000
college or above	0.051	0.220	0.000	1.000
Income				
Logged household income per capita	8.570	0.931	3.856	12.084
Number of children alive				
number of surviving daughters	0.709	0.714	0.000	4.000
number of surviving sons	0.854	0.649	0.000	4.000
n=1005				

Figure 4.6 Tolerance Values of the Independent Variables in the Desired Fertility Full Model Based on the Residential Pattern of Married Women's Parents-in-Law

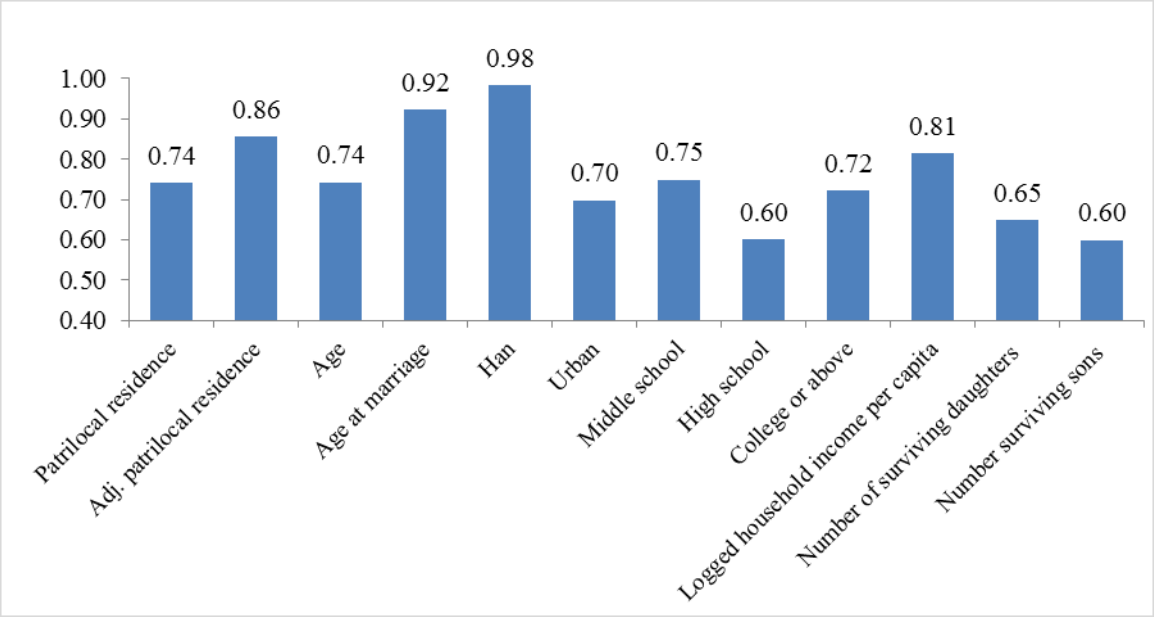
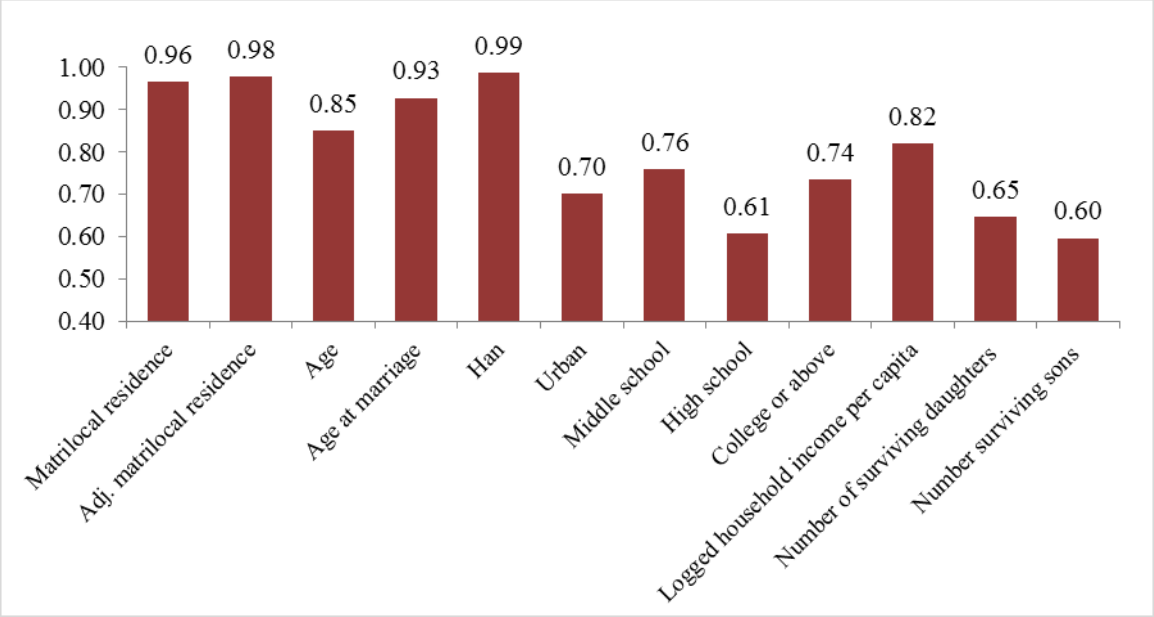


Figure 4.7 Tolerance Values of the Independent Variables in the Desired Fertility Full Model Based on the Residential Pattern of Married Women's Parents



Before estimating the logistic regression model, I tested for the presence of strong multicollinearity among the independent variables. All independent variables had tolerances above 0.4, well within an acceptable level (see Figure 4.6 and 4.7). The lowest tolerance of the independent variables in both full models was the number of sons alive, which was 0.60; the mean tolerance of all the independent variables in the patrilocal residence full model was 0.76. The mean tolerance of all the independent variables in the matrilocal residence full model was 0.80.

As mentioned above, I have two separate sets of models to account for the effects of family structure. One focused on the residential patterns of married women's parents-in-law, while the other focused on the residential patterns of married women's parents. I introduced the major independent variables used to measure family structure, demographic variables, socioeconomic variables and variables measuring women's achieved fertility into the models, step by step. Since CHNS used a multistage cluster survey design in which counties and cities were served as the primary survey units, the estimates of the parameters were adjusted for clustering in the data.

The results of the logistic regression models based on the residential patterns of parents-in-law are represented in Table 4.6. In this case, family households were divided into three categories, namely, patrilocal residence, adjusted patrilocal residence, and others. Model 1.1 shows the effects of the residential patterns of parents-in-law without controlling for other influential factors. For married women who had at least one surviving child, as compared to others, patrilocal residence increased the odds of wanting another child by 164%; adjusted patrilocal residence increased the odds by 89%.

As is clearly indicated by these numbers, having parents-in-law in the same household, or as neighbors, significantly increased married women's desire for another child, without controlling for other factors.

Table 4.6 Estimates of the Odds Ratios for the Desired Fertility Models Based on the Residential Pattern of Married Women's Parents-in-Law

Variables	Model 1.1	Model 1.2	Model 1.3	Model 1.4
Residential Pattern of Parents-in-law				
Others (ref)				
Patrilocal residence	2.637**	1.392	1.473*	1.438*
Adj. patrilocal residence	1.887**	1.775**	1.806**	1.804**
Age		0.886**	0.885**	0.921**
Age at marriage		1.112**	1.113**	1.103**
Nationality				
Others (ref)				
Han			0.797	0.731
Place of residence				
Rural (ref)				
Urban			0.990	0.711
Education				
Primary school or below (ref)				
Middle school			1.145	0.990
High school			1.095	0.902
College or above			0.910	0.674
Income				
Logged household income per capita			1.354**	1.116
Number of children alive				
Number of daughter alive				0.283**
Number of son alive				0.186**
Wald Chi-Square	24.68**	62.92**	105.06**	135.18**
Pseudo R Square	0.026	0.088	0.100	0.154

Note: ** P-Value < 0.05; * P-Value <0.1

Adding demographic characteristics, socioeconomic status, and achieved fertility of married women decreased the magnitude of the influence of family structure, but failed to invalidate its statistical significance. Co-residing or neighboring with parents-in-law always increased the odds of wanting another child for married women who had at least one surviving child. In the full model (Model 1.4), after controlling for all other variables, patrilocal residence increased the odds of wanting another child by 44%, and this effect was significant at the level of significance of 0.1; adjusted patrilocal residence significantly increased the odds of wanting another child by 80%, and this effect was significant at the level of significance of 0.05.

Results from the logistic models based on the residential patterns of married women's parents showed a somewhat different scenario (see Table 4.7). Without accounting for the effects of other influential factors, matrilocal residence had a significant influence on married women's desire for another child. Co-residing with parents significantly increased the odds of wanting another child by 150% for married women with one or more surviving children, but having parents as neighbors did not show any significant influence. However, the significance of the positive effects of matrilocal residence disappeared after adding control variables into the logistic regression models.

Besides family structure, special attention was paid to the two control variables measuring achieved fertility. No matter which perspective was used to identify family structure, the significant effects of achieved fertility were significant and strong, as expected. For married women who already had at least one child, controlling for all

other factors, one more surviving daughter decreased the odds of wanting another child by almost 70%, and one more surviving son decreased the odds by nearly 80%.

Table 4.7 Estimates of the Odds Ratios for the Desired Fertility Models Based on the Residential Pattern of Married Women's Parents

Variables	Model 2.1	Model 2.2	Model 2.3	Model 2.4
Residential Pattern of Parents				
Others (ref)				
Matrilocal residence	2.497**	1.568	1.573	1.264
Adj. matrilocal residence	1.152	1.422	1.313	1.207
Age		0.881**	0.878**	0.914**
Age at marriage		1.111**	1.117**	1.106**
Nationality				
Others (ref)				
Han			0.837	0.782
Place of residence				
Rural (ref)				
Urban			0.957	0.690
Education				
Primary school or below (ref)				
Middle school			1.125	0.971
High school			0.984	0.824
College or above			0.780	0.574
Income				
Logged household income per capita			1.353**	1.123
Number of children alive				
Number of daughter alive				0.288**
Number of son alive				0.188**
Wald Chi-Square	4.44	65.39**	90.82**	116.51**
Pseudo R Square	0.005	0.084	0.094	0.148

Note: ** P-Value < 0.05; * P-Value <0.1

4.1.6 Conclusion

In this section of the chapter, I examined the desire for another child in order to assess how family structure influences desired fertility. The effects of family structure on desired fertility were as expected. Co-residence with parents-in-law or having parents-in-law as neighbors significantly increased the odds of wanting another child for married women who were of childbearing age and who had at least one surviving child. However, the residential patterns of married women's parents did not have any significant impact.

4.2 The Effects of Family Structure on Transition from Marriage to First Birth

I now turn to my analysis of the effects of family structure on the transition from marriage to first birth. To ascertain the effects of family structure on this transition, I have estimated Cox proportional hazard models. In this analysis, the dependent variable of the transition is measured with two variables: the occurrence of a first birth after marriage (yes/no), and the time interval between a marriage and a first birth. In the paragraphs below, I will present the four hypotheses first. Then I will introduce the specific dataset and the variables for this analysis. After that, I will report and interpret the results from the fitted Cox proportional hazards models.

4.2.1 Hypotheses

In this section, I test the following hypotheses:

1. Co-residence with parents-in-law increases the hazard of having a first birth for married women.

2. Quasi-coresidence with parents-in-law increases the hazard of having a first birth for married women.
3. Co-residence with parents does not influence the hazard of having a first birth among married women.
4. Quasi-coresidence with parents does not influence the hazard of having a first birth among married women.

4.2.2 Dataset

Married women aged 15 to 44 with no births were selected from the CHNS data to test these four hypotheses. Several extra steps were required to prepare a properly structured dataset from the panel data, in order to fulfill the prerequisites of the Cox proportional hazards model. First, individual records from each panel were conflated based on each respondent's household ID and personal ID; thus, individual records from all panels were linked together. Then I constrained the observation time between the date of survey in 1991 and the date of the survey in 2009. For each selected woman, her exposure to the risk of having a first birth began at the date of marriage and ended at the birth of her first child or at the time of censoring.

The CHNS data were collected from panel surveys usually used to construct longitudinal data for events of interest, such as pregnancy and childbearing. At each panel, married women were asked for detailed information about their childbearing experiences since their participation in the last panel. For example, in the ever-married women survey from the CHNS, married women were asked for information regarding all of their pregnancies and births between the survey dates of the previous survey panel

and the current survey panel. Putting each respondent's responses together resulted in obtaining a woman's complete pregnancy and birth history, through the date of the most recent survey panel. As mentioned in the previous paragraph, women's exposure to the risk of having a first birth begins at the date of their marriage, but the observations began no earlier than the survey date in 1991. As a result, I not only have certain complete observations, but also various incomplete observations that, over time, result in censoring and truncation (see Figure 4.8). For example, both the marriage and the birth of a first child for Woman A were under observation. Woman B was right-censored in that she got married while under observation, but failed to give information regarding the birth of her first child by the date of her last interview. Woman C indicates a left-truncation case in that she got married before the date of the first interview, but the date of the birth of her first child was under observation. A combination of the situations for Woman B and Woman C is shown in Women D, who got married before the date of her first interview and failed to give birth to her first child by the date of her last interview. Similar to Woman B, Woman E also demonstrates a right-censoring case, though her record is not complete because it disappeared after her interview in 1997. Woman F illustrates a more complicated case. She did not participate in the survey in 2000, but reappeared in surveys conducted after 2004. These examples do not exhaust all the possibilities, but their scenarios cover most of the women in the sample. As discussed in Chapter III, the Cox proportional hazards model is able to deal with all these cases with censoring and truncation.

Figure 4.8 Diagrams of Censoring and Truncation

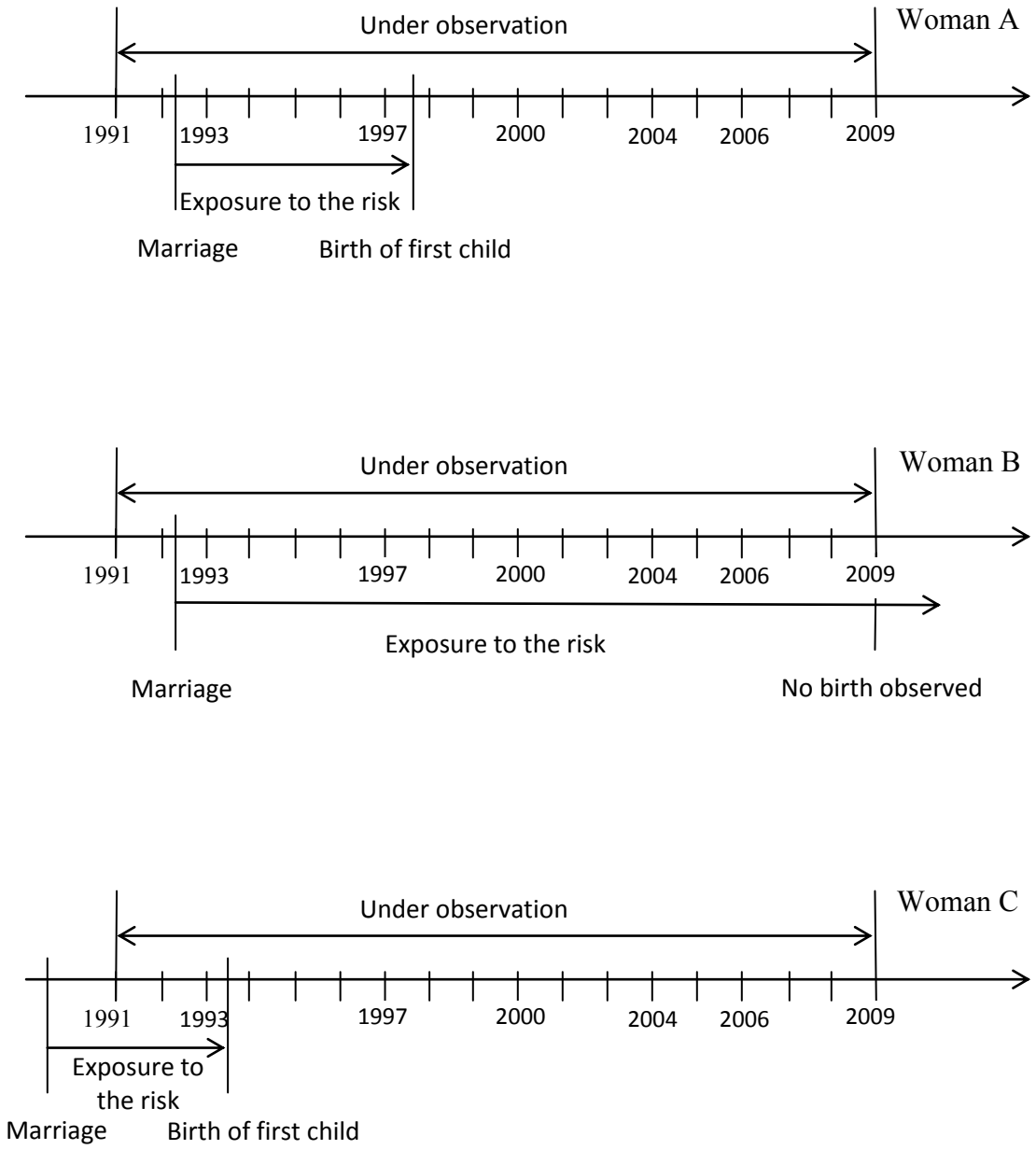
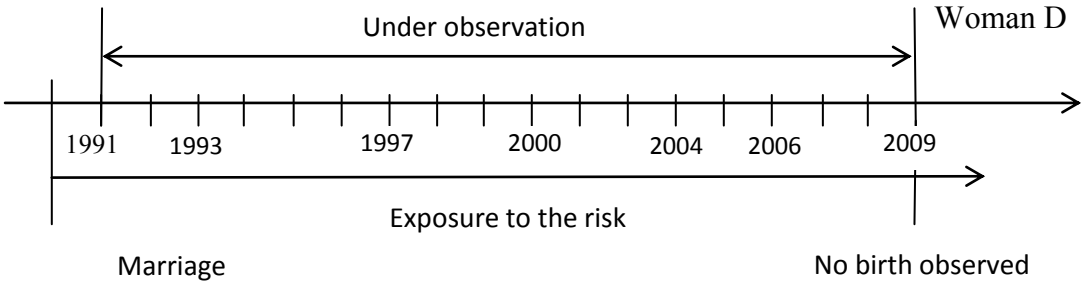
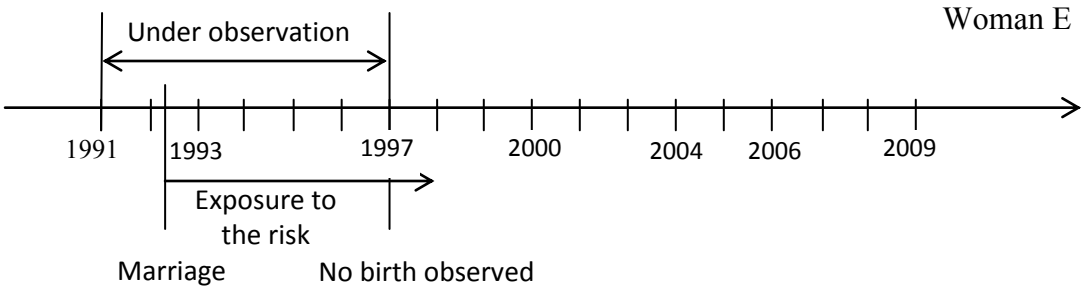
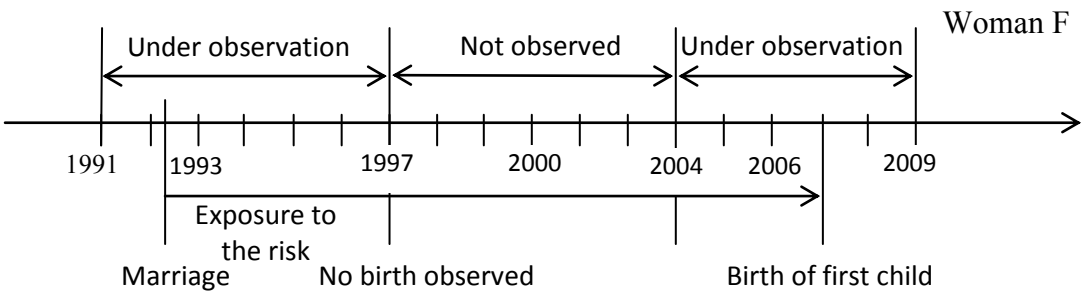


Figure 4.8 Continued







In addition, family structure, education, and income were all likely to change over time. Instead of recording the exact times of the changes, panel surveys indicated only their status at each survey time. The best way to handle values for these time-varying variables is to assume that respondents retained these characteristics until their next interview. For example, if a woman reported that she lived with her parents-in-law in 1991 and then in the following survey in 1993 responded that she did not live with her parents-in-law, though I could not know when (between 1991 and 1993) her parents-in-law move, I assumed that the family all lived together until the date of the interview in 1993. Obviously, the shorter the interval between two survey interviews, the more solid is this assumption. The CHNS conducted interviews to collect data every two to four years; therefore, it is not very sound to apply the same assumptions to a woman who was interviewed only in two panels that were far apart, such as 1991 and 2009. To avoid significant invalidation of this assumption, I limited the sample to women who participated in at least two continuous interviews, and only data from these continuous interviews were used in this analysis. Again, as discussed in Chapter III, the Cox proportional hazards model is able to function with time-varying independent variables.

To focus more so on marital fertility and to get more accurate statistical estimations of the effects of the independent variables, the sample also excludes women who gave birth before nine months after the date of marriage, births which were very "likely due to premarital conception, or perhaps reporting mistakes in either the date of birth or date of marriage, or premature births" (Chen 2006). The final sample consists of

188 women who were interviewed in at least two continuous surveys between 1991 and 2009.

4.2.3 Conceptualization and Operationalization

To investigate the transition from a marriage to a first birth, I addressed two questions. First, did a woman have a birth after marriage? Second, if yes, how long did it take from the marriage to the first birth? Also, if no, how long was the duration from the marriage to the date of censoring? Answers to these questions were obtained directly from the ever-married women survey performed by the CHNS. As mentioned above, interviews conducted during each panel asked all married female respondents the same questions regarding their pregnancies and birth histories since their last interview. Women first were asked whether they had been pregnant since the last interview. If a woman was pregnant during this period, she was asked to provide the date and the sex of the birth if a live birth occurred as a result. Accordingly, the dependent variable for this analysis consisted of two components. The first was whether a first birth after a marriage occurred between 1991 and 2009. Thus, this was a binary outcome, as either an occurrence was observed or it was not. The second component was the number of months between the date of a marriage and the date of a first birth, or the number of months between the date of a marriage and the date of the last interview if no birth occurred. This information was converted from a comparison between the date of a marriage and the date of a first birth or the date of the interview.

The principal independent variable, family structure, followed the rule set in the first analysis. Two separate sets of variables were used for two separate sets of models,

one aiming at examining the effects of the residential patterns of parents-in-law, and the other aiming at examining the effects of the residential patterns of parents. The only difference in this analysis from the previous one was that variables measuring family structure were used as time-varying, and are lagged in the models. Family structure reported at one interview was assumed unchanged until the date of the next interview. Applying this assumption did not solve the issue of causality completely, but it was definitely better than making an inference regarding the effects of the family structure on the achieved fertility based on the current family structure (Chen 2006).

This analysis also controlled for various demographic and socioeconomic factors, as was the case in the previous analysis of desired fertility, namely, the birth years of the women, their age at marriage, nationality, place of residence, education, and income, with a few variations in the measurements. Particularly, I used birth year instead of age, because it provided more valid information for the longitudinal analysis. In this dataset, women in different birth cohorts could enter the dataset at the same year, while women in the same birth cohort could participate in this survey in different years. Obviously, a woman aged 30 in 1991 was born in a different year, and thus in a different social context, from a woman who was 30 in 2000. Therefore, unlike with cross-sectional data where age and birth year can easily be converted to one another, in longitudinal data birth year is a better choice for capturing differences due to birth cohort. Different from the previous analysis, I did not control for the composition of achieved fertility in this analysis; the reason is that all women in this sample had no previous births.

4.2.4 Descriptive Statistics

The 188 married women included in the final sample contributed 5,825 women-months. Among these subjects, 93 women gave birth to their first children under observation. The duration months from marriage to the first birth, or the duration from marriage to the last observation, ranged from 0 to 312. The Kaplan-Meier estimate shows that more than three quarters of these married women had their first births within eight years of marriage (see Figure 4.9). It also suggests that if a woman did not have her first birth within eight years of marriage, she was very likely to have no births at all (see Figure 4.10).

Figure 4.9 Kaplan-Meier Failure Estimate for the Transition from Marriage to First Birth

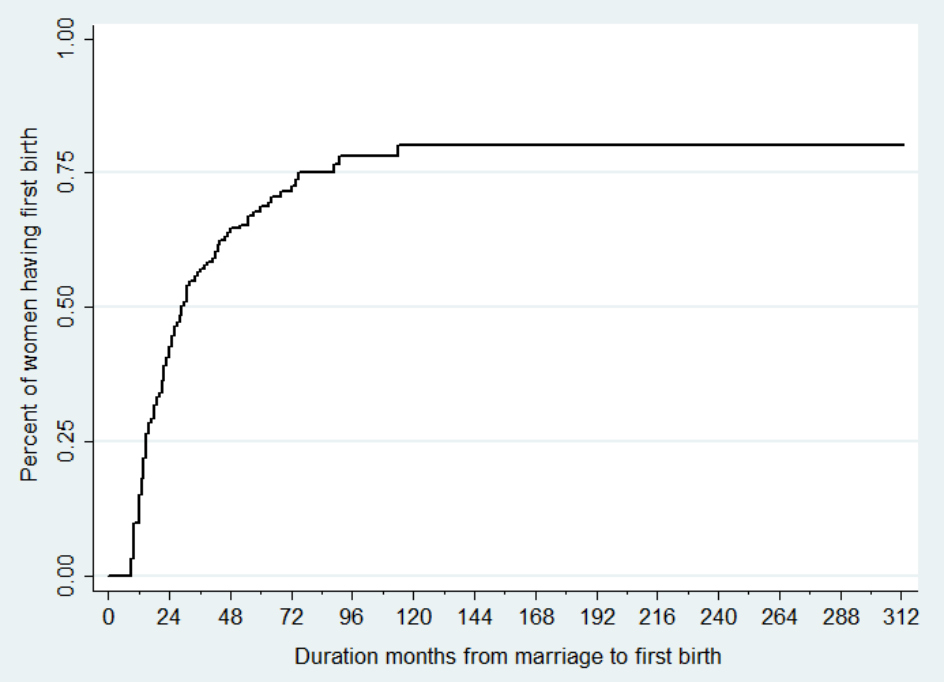
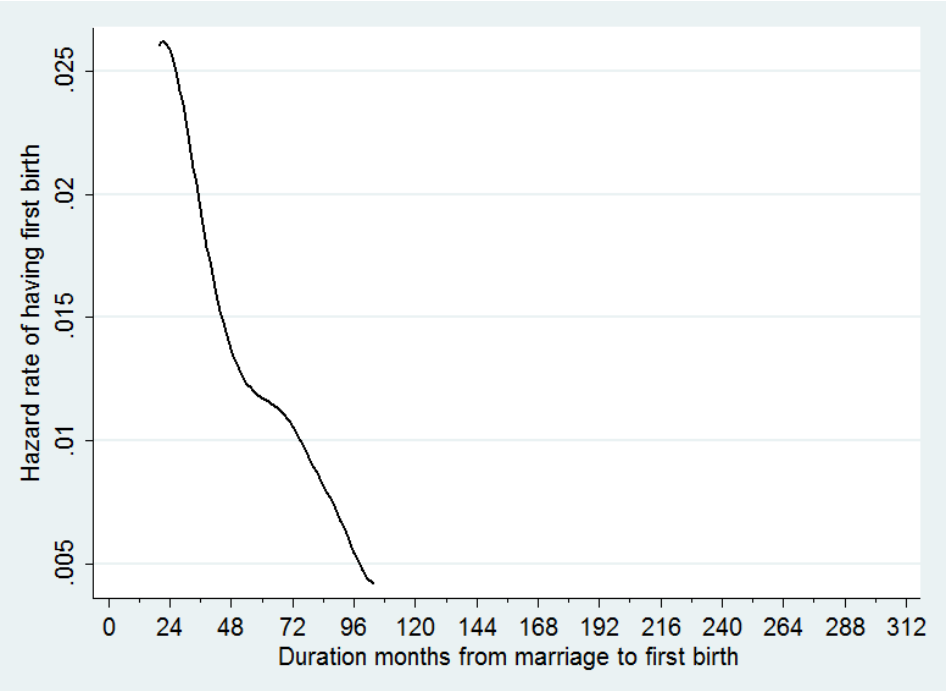


Figure 4.10 Smoothed Hazard Estimate for the Transition from Marriage to First Birth



The descriptive statistics of the independent variables for the 188 women in the sample are shown in Table 4.8. As mentioned above, in this analysis family structure, education, and income were used as time-varying and were lagged in the model. For example, the values of the dummy variable of "patrilocal residence" had to be changed for six women, while the values of the dummy variable of the "adjusted patrilocal residence" were changed for only one woman. As another example, among these 188 sampled women, 27 reported different incomes across the surveys.

Given the dynamic attribute of the time-varying independent variables, I present in Table 4.8 their average values and distributions in terms of women-months instead of women. Therefore, regarding the residential patterns of married women's parents-in-law,

Table 4.8 Descriptive Statistics for the Transition from Marriage to First Birth Models

Variables	Constant Subjects	Varying Subjects	Mean/ Proportion	Std. Dev.	Min	Max
Residential Pattern of Parents-in-law						
Others (ref)						
Patrilocal residence	182	6	0.576	0.494	0.000	1.000
Adj. patrilocal residence	187	1	0.081	0.272	0.000	1.000
Residential Pattern of Parents						
Others (ref)						
Matrilocal residence	186	2	0.046	0.209	0.000	1.000
Adj. matrilocal residence	187	1	0.037	0.189	0.000	1.000
Birth year	188	0	1972	7	1947	1986
Age at marriage	188	0	23.036	2.424	15.500	31.083
Nationality						
Others (ref)						
Han	188	0	0.900	0.300	0.000	1.000
Place of residence						
Rural (ref)						
Urban	188	0	0.397	0.489	0.000	1.000
Education						
Primary school or below (ref)						
Middle school	184	4	0.391	0.488	0.000	1.000
High school	187	1	0.252	0.434	0.000	1.000
College or above	187	1	0.114	0.318	0.000	1.000
Income						
Logged household income per capita	161	27	8.404	0.983	4.074	10.939

n = 5,825 (women-months)

57.6% of the total women-months were occupied by patrilocal residence, 8.1% by adjusted patrilocal residence, and 34.3% by other family structures. Regarding the residential patterns of married women's parents, only 4.6% of the total women-months were occupied by matrilocal residence and 3.7% by adjusted matrilocal residence. These percentages indicate the prevalence of patrilocal residence, and confirm the unpopularity of matrilocal residence. Most married women co-resided with their parents-in-law or lived nearby their parents-in-law, at least for some period of time.

The interpretation of the descriptive statistics of the time-invariant variables is more straightforward. The average birth year for the selected women was 1972; the average age at marriage was 23. Of the sample, 90% were Han women, and nearly 40% lived in urban areas. The principal independent variables and the control variables were introduced to the Cox proportional hazards models step by step, and I have separate models accounting for the effects of the residential patterns of married women's parents-in-law and married women's parents, respectively.

4.2.5 Results of Cox Proportional Hazards Models

Before going to the fitted Cox proportional hazards models, I investigated the potential violations of the two major assumptions of the Cox proportional hazards model. First, I examined whether or not there was strong multicollinearity among the independent variables. All had tolerances above 0.4, well within an acceptable level (see Table 4.9). Thus, there were no problems of multicollinearity with the independent variables. Then, I tested the proportionality assumption using the Schoenfeld residuals. The results of this test for the full model accounting for the effects of the residential

Table 4.9 Tolerance Values of the Independent Variables in the Transition from Marriage to First Birth Full Models

Variables	Tolerance Value	
Residential Pattern of Parents-in-law		
Others (ref)		
Patrilocal residence	0.75	
Adj. patrilocal residence	0.76	
Residential Pattern of Parents		
Others (ref)		
Matrilocal residence		0.97
Adj. matrilocal residence		0.98
Birth year	0.80	0.82
Age at marriage	0.84	0.85
Nationality		
Others (ref)		
Han	0.88	0.89
Place of residence		
Rural (ref)		
Urban	0.70	0.70
Education		
Primary school or below (ref)		
Middle school	0.52	0.54
High school	0.42	0.43
College or above	0.51	0.51
Income		
Logged household income per capita	0.70	0.71
Mean	0.69	0.74

Table 4.10 Proportionality Assumption Test for the Transition from Marriage to First Birth Full Model Based on the Residential Pattern of Married Women's Parents-in-Law

Variables		Rho	Chi Square	P-value
Residential Pattern of Parents-in-law				
	Others (ref)			
	Patrilocal residence	0.109	1.760	0.185
	Adj. patrilocal residence	-0.016	0.050	0.823
Birth year		0.072	0.710	0.399
Age at marriage		0.254	6.200	0.013
Nationality				
	Others (ref)			
	Han	-0.053	0.260	0.610
Place of residence				
	Rural (ref)			
	Urban	-0.017	0.020	0.880
Education				
	Primary school or below (ref)			
	Middle school	-0.034	0.200	0.651
	High school	-0.019	0.060	0.804
	College or above	0.024	0.060	0.810
Income				
	Logged household income per capita	-0.074	0.550	0.455
Global Test			9.410	0.494

patterns of parents-in-law showed that the control variable, age at marriage, failed to satisfy this assumption (see Table 4.10). Therefore, age at marriage was included in this set of models with time-varying coefficients. That is to say, the value of birth year "remain[s] the same but the marginal effect changes so the aggregate effect still changes" (Cleves, Gutierrez, Gould, and Marchenko 2010: 190) .The same test for the full model accounting for the effects of the residential pattern of parents did not indicate any independent variable violating the proportionality assumption seriously (see Table 4.11). However, to construct consistent and comparable models, I applied time-varying coefficients to age at first marriage for both sets of models.

Table 4.12 shows the results from the Cox proportional hazards models estimating the hazard of having a first birth based on the models accounting for the effects of the residential patterns of parents-in-law. The estimates are presented in the form of hazard ratios. Model 3.1 uses variables measuring family structure as the only predictors. The results clearly suggest that family structure had positive and significant effects on the transition from a marriage to a first birth. The hazard of having a first birth at a given month for the married women co-residing or neighboring with parents-in-law was 140% higher than those who did not. The significance of the effects of patrilocal residence is maintained after introducing the control variables, while the significance of the effects of adjusted patrilocal residence fades out. The evaluation of the overall model fit using Cox-Snell residuals is presented in Figure 4.11. It shows that the cumulative hazard of the Cox-Snell residuals follow a straight 45° line pattern, suggesting the full model of the transition from a marriage to a first birth accounting for the effects of the

residential patterns of parents-in-law fit the data well (Cleves, Gutierrez, Gould, and Marchenko 2010: 220).

Table 4.11 Proportionality Assumption Test for the Transition from Marriage to First Birth Full Model Based on the the Residential Pattern of Married Women's Parents

Variables	Rho	Chi Square	P-value
Residential Pattern of Parents			
others (ref)			
matrilocal residence	-0.125	1.460	0.226
adj. matrilocal residence	-0.189	3.640	0.057
Birth year	0.107	1.960	0.162
Age at marriage	0.224	3.570	0.059
Nationality			
others (ref)			
Han	-0.093	0.950	0.329
Place of residence			
rural (ref)			
urban	-0.017	0.020	0.878
Education			
primary school or below (ref)			
middle school	-0.022	0.060	0.812
high school	-0.018	0.040	0.836
college or above	0.071	0.500	0.479
Income			
Logged household income per capita	-0.071	0.450	0.504
Global Test		12.450	0.256

Table 4.12 Estimates of the Hazard Ratios for the Transition from Marriage to First Birth Models Based on the Residential Pattern of Married Women's Parents-in-Law

Variables		Model 3.1	Model 3.2	Model 3.3
Main Effect				
Residential Pattern of Parents-in-law				
	Others (ref)			
	Patrilocal residence	2.437**	2.289**	2.565**
	Adj. patrilocal residence	2.402*	2.140	2.153
Birth year			0.957*	0.965
Age at marriage			0.776**	0.791**
Nationality				
	Other (ref)			
	Han			0.494**
Place of residence				
	Rural (ref)			
	Urban			1.271
Education				
	Primary school or below (ref)			
	Middle school			0.970
	High school			0.689
	College or above			0.845
Income				
	Logged household income per capita			0.918
Time-Varying Effect				
Age at marriage			1.006**	1.006**
Wald Chi-Square		7.66**	28.50**	35.13**

Note: ** P-Value < 0.05; * P-Value <0.1

Figure 4.11 Cumulative Hazards of Cox-Snell Residuals for the Transition from Marriage to First Birth Full Model Based on the Residential Pattern of Married Women's Parents-in-Law

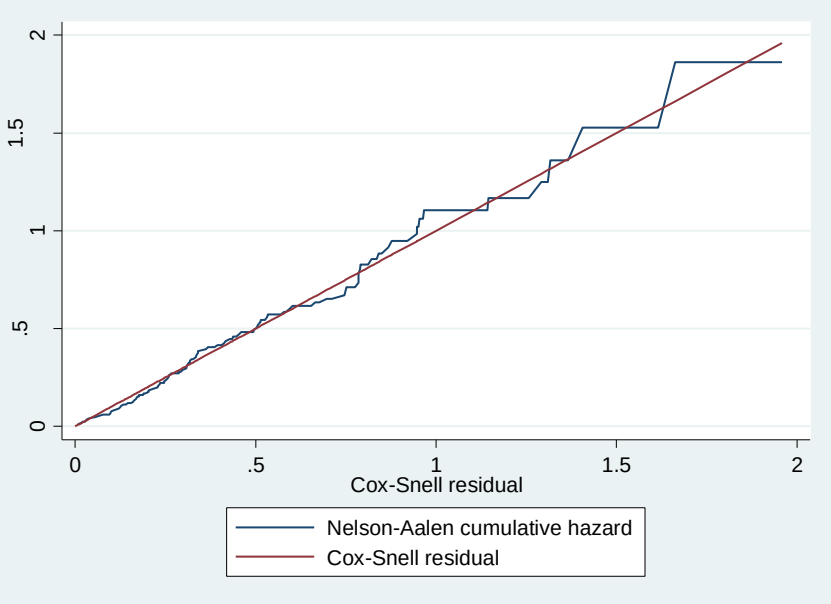


Figure 4.12 Cumulative Hazards of Cox-Snell Residuals for the Transition from Marriage to First Birth Full Model Based on the Residential Pattern of Married Women's Parents

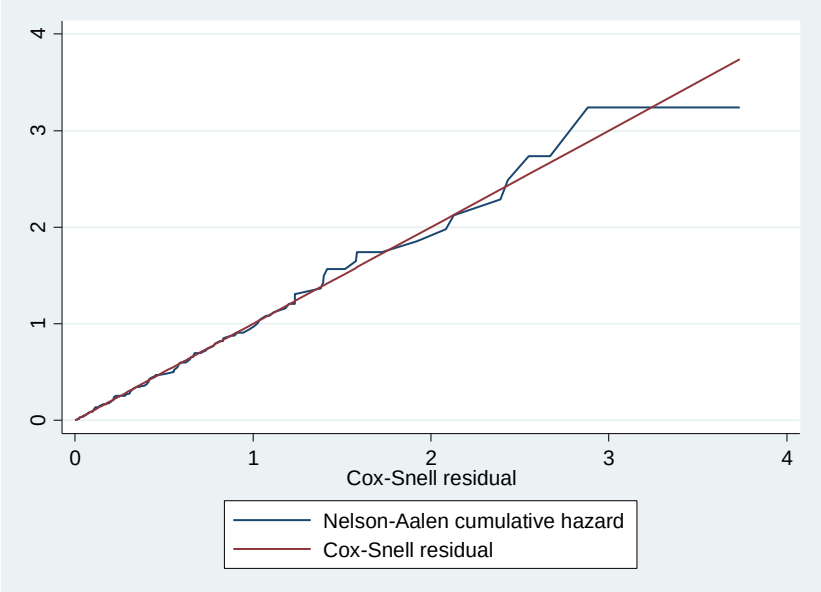


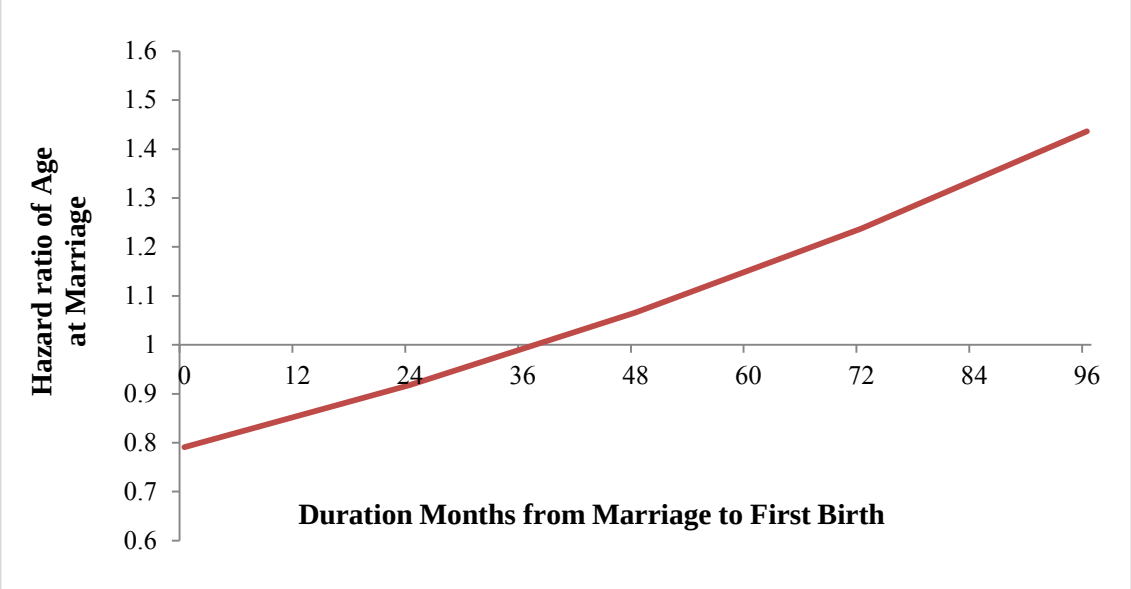
Table 4.13 Estimates of the Hazard Ratios for the Transition from Marriage to First Birth Models Based on the Residential Pattern of Married Women's Parents

Variables	Model 4.1	Model 4.2	Model 4.3
Main Effect			
Residential Pattern of Parents			
Others (ref)			
Matrilocal residence	0.528	0.654	0.732
Adj. matrilocal residence	1.267	1.225	1.296
Birth year		0.954*	0.966
Age at marriage		0.771**	0.788**
Nationality			
Others (ref)			
Han			0.646
Place of residence			
Rural (ref)			
Urban			1.162
Education			
Primary school or below (ref)			
Middle school			0.993
High school			0.635
College or above			0.820
Income			
Logged household income per capita			0.922
Time-Varying Effect			
Age at marriage		1.006**	1.006**
Wald Chi-Square	1.07	14.95**	19.93**

Note: ** P-Value < 0.05; * P-Value <0.1

The effects of the residence of married women's parents were somewhat different from those of patrilocal residence. Matrilocal residence decreased the hazard of having a first birth for a married woman, but having parents as neighbors increased this hazard. However, neither matrilocal residence nor adjusted matrilocal residence had a statistically significant influence on married women's fertility (see Table 4.13). The overall model fits the data well, as is shown in Figure 4.12.

Figure 4.13 Changing Effects of Age at Marriage for the Transition from Marriage to First Birth Full Models



Among all the control variables, age at marriage had the most significant effects on the transition from marriage to first birth in both sets of models. With the time-varying coefficient, the effect of age at marriage was split into two parts. The main effect of age at marriage was negative. However, its effect changed over time (see Figure

4.13). Within the first three years of marriage, a higher age at marriage decreased the hazard of having a first birth at a given month, but after that a higher age at marriage increased the hazard significantly.

4.2.6 Conclusion

The effects of the patrilocal family on the transition from marriage to first birth were confirmed in this analysis. As hypothesized, co-residence with parents-in-law significantly increased the hazard of having a first birth. This outcome is consistent with the theoretical discussion that co-residence with parents-in-law promotes earlier childbearing and a higher rate of fertility. I also hypothesized that having parents-in-law as neighbors had a similar effect as co-residence with parents-in-law, in terms of encouraging earlier childbearing behavior. According to the results of the Cox proportional hazards models, having parents-in-law as neighbors did show positive effects on marital fertility as it increased the hazard of having a first birth after a marriage. However, the effects of this particular family structure were not significant after controlling for other influential factors. There is no evidence in my analyses to support the conclusion that matrilocal residence has positive effects on fertility, regardless of whether I looked at co-residence with parents, or having parents as neighbors. This finding confirms the hypotheses regarding the effects of the residential pattern of married women's parents.

4.3 The Effects of Family Structure on Transition from First Birth to Second Birth

I now focus on the transition to second birth instead of to first birth. Similar to the previous analysis, I investigate the effects of family structure on the transition from

first birth to second birth by estimating Cox proportional hazard models. I present four hypotheses first, followed by an introduction of the specific dataset. Most variables are retained in this analysis except for the dependent variable and the independent variables of family structure, birth year, age at marriage and education. I also discuss these variables in detail in the conceptualization and operationalization section. Then, I present the results and draw conclusions from the findings.

4.3.1 Hypotheses and Dataset

In the following analyses, I investigate the transition from first birth to second birth using the Cox proportional hazards model. To be more specific, in this section I test the following hypotheses:

1. Co-residence with parents-in-law increases the hazard of having a second birth among married women.
2. Quasi-coresidence with parents-in-law increases the hazard of having a second birth among married women.
3. Co-residence with parents does not influence the hazard of having a second birth among married women.
4. Quasi-coresidence with parents does not influence the hazard of having a second birth among married women.

All married women from age 15 to 44 with one surviving child were selected to test these four hypotheses. Relevant data from the seven panels occurring between 1991 and 2009 were conflated following the rules used in the previous analysis. Finally, 1,718 ever-married women were selected for analysis.

4.3.2 Conceptualization and Operationalization

The dependent variable in this analysis measured the transition from the first birth to second birth, and consisted of two parts. The first part indicated whether or not a second birth occurred, while the second part measured the time interval between a first birth and a second birth if a second birth was observed, and if not, the time of censoring. However, empirically, a woman's exposure to the risk of having a second birth did not begin right after a first birth. Lactational amenorrhea as the natural postnatal infertility happens when a woman is amenorrheic and fully breastfeeding. This postnatal infertility usually lasts six months after a birth (McNeilly, Tay, and Glasier 1994). Therefore, the exposure to the risk of having a second birth begins only when the postnatal infertility has ended. In addition, before a live birth there is usually a nine-month pregnancy, which also postpones the exposure to the risk of having a second birth. Among all the selected women, the first observation of a second birth generally happened fifteen months after the first birth, which confirmed the existence of postnatal infertility. In actuality, the period of postnatal infertility can vary from six month to even longer, due to different breastfeeding behaviors and variations in other related factors. Thus, it is impossible to obtain precisely the specific starting point of the exposure to the risk of having a second birth for each individual woman. Since my research is focused more on the effect of family structure on the transition from first birth to second birth (rather than the physical mechanisms behind postnatal infertility), to make it easier to interpret the results I purposely set the start point of the exposure to the risk of having a second birth at the the date of the first birth.

Independent variables were retained in the same forms as they were in the previous analysis, except for the variables of age at marriage and education. Two women in this dataset with changed ages at marriage implied that they had experienced a divorce and remarriage during the observation period. Therefore, age at marriage, as well as family structure, education, and income were all used as time-varying independent variables. In addition, in terms of education, women were divided into two categories instead of four categories. Women with high school or college diplomas were distinguished from those with an education level less than high school. The reason for using two categories instead of four categories was that, in this sample, there was not as much variation in education as in the sample used for the transition from marriage to first birth model. Finally, since women in this dataset were those with one surviving child, this analysis included a dummy variable of the sex of first child as a control variable in the Cox proportional hazards models.

4.3.3 Descriptive Statistics

The 1,718 married women included in the final sample contributed 121,989 women-months. Among these women, 131 gave birth to their second child under observation. The longest duration of months from the first birth to the second birth, or from the first birth to the last observation, was 391. The Kaplan-Meier estimate showed that less than a quarter of the selected women had their second births within 33 years after the first birth (see Figure 4.14). If a woman did not have a second birth within sixteen years after the first birth, she was very unlikely to have a second birth (see Figure 4.15).

Figure 4.14 Kaplan-Meier Failure Estimate for the Transition from First Birth to Second Birth

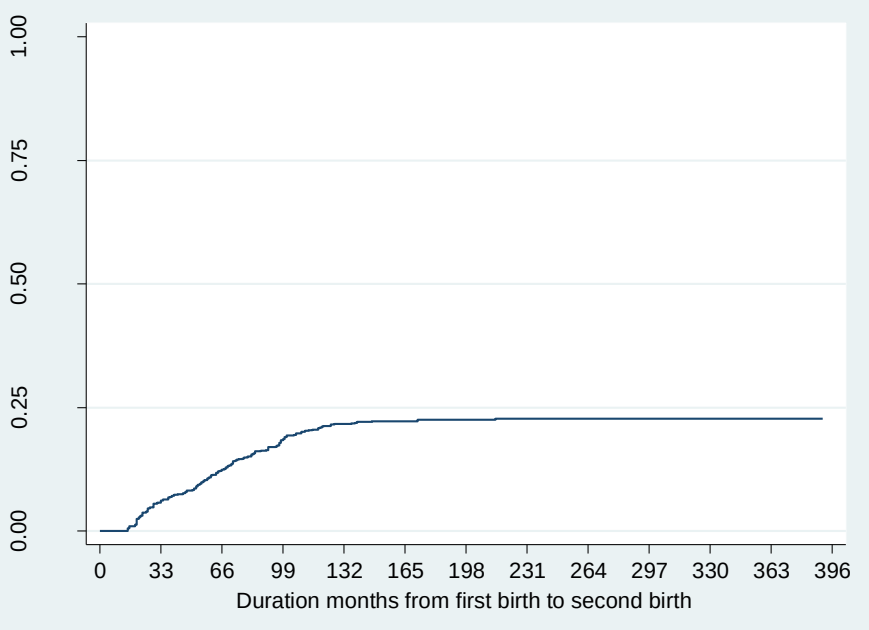
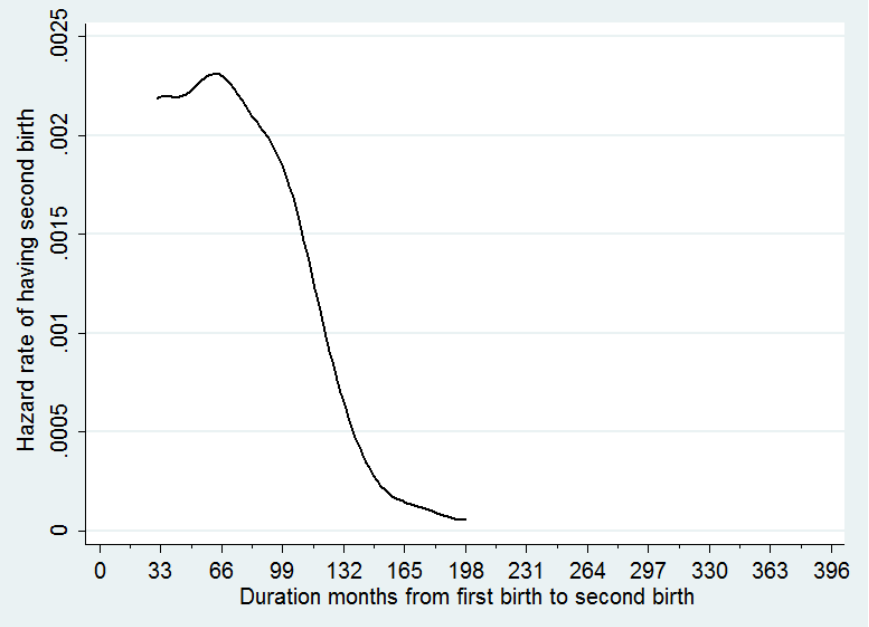


Figure 4.15 Smoothed Hazard Estimate for the Transition from Marriage to First Birth



The descriptive statistics of the independent variables and control variables for these selected 1,718 women are shown in Table 4.14. Compared with the dataset used for the previous analysis, more changes in family structure, education, and income were observed here because more women were included in this sample. Overall, more than half of the women-months in this sample were for women with a patrilocal residence or an adjusted patrilocal residence. However, compared with married women with no births in the previous analysis, women with one birth in this analysis were less likely to co-reside with parents-in-law, but more likely to have parents-in-law as their neighbors. On the one hand, this pattern confirmed the popularity of patrilocal residence in China. On the other hand, it suggested that people tended to accommodate their family structure to family size, while successfully maintaining the traditional family structure to some extent. Matrilocal residence accounted for a very small proportion of families. Only 10% of the women-months were attributed to women living with their parents or having those parents as neighbors. Since women in this sample had a relatively low level of education, instead of using four categories I used two categories to capture whether a married woman graduated from high school or not. Of these women, 34.4% women-months were attributed to high school or above. Thus, 65.6% of them were related with education levels less than high school. The average age at marriage of these 1,718 ever-married women was 23, the same as in the previous analysis. Among these 1,718 ever-married women, 91.5% were Han, 41% lived in urban areas, and 41.1% had a surviving daughter.

Table 4.14 Descriptive Statistics for the the Transition from First Birth to Second Birth Models

Variables	Constant Subjects	Varying Subjects	Mean/ Proportion	Std. Dev.	Min	Max
Residential Pattern of Parents-in-law						
Others (ref)						
Patrilocal residence	1584	134	0.318	0.466	0.000	1.000
Adj. patrilocal residence	1486	232	0.215	0.411	0.000	1.000
Residential Pattern of Parents						
Others (ref)						
Matrilocal residence	1687	31	0.044	0.205	0.000	1.000
Adj. matrilocal residence	1610	108	0.061	0.239	0.000	1.000
Birth year	1718	0	1965	6.777	1947	1985
Age at marriage	1716	2	23.095	2.525	16.250	41.667
Nationality						
Others (ref)						
Han	1718	0	0.915	0.279	0.000	1.000
Place of residence						
Rural (ref)						
Urban	1718	0	0.410	0.492	0.000	1.000
Education						
Less than high school (ref)						
High school or above	1650	68	0.344	0.475	0.000	1.000
Income						
Logged household income Per capita	744	974	8.412	0.826	3.240	12.084
Sex of first birth						
Male (ref)						
Female	1718	0	0.411	0.492	0.000	1.000
n = 121,989 (women-months)						

4.3.4 Results of Cox Proportional Hazards Model

I distinguished between sets of models to examine the effects of the residential patterns of married women's parents-in-law and the residential patterns of their parents. The principal independent variables and the control variables were introduced in the Cox proportional hazards models, step by step, as I did in the previous analyses. Before going to the Cox proportional hazards models, I investigated the potential violations of two major assumptions for the full Cox proportional hazards models. There was no presence of strong multicollinearity in the independent variables, as all had values of tolerance above 0.4, well within acceptable levels (see Table 4.15). Then, I tested the proportionality assumption with the Schoenfeld residuals. The results of this test for both sets of models showed that the control variable, birth year, failed to satisfy this assumption (see Tables 4.17 and 4.18); therefore, it was included in models with time-varying coefficients. The test for the full model using the residential patterns of parents also indicated that the effect of the dummy variable of the adjusted matrilocal residence violated the proportionality assumption (see Table 4.17). Thus, it was included in the models accounting for the effects of the residential pattern of married women's parents with time-varying coefficients, as well.

Table 4.18 shows the results from the Cox proportional hazards models estimating the hazard of having a second birth based on the residential pattern of married women's parents-in-law. Once again, the estimates are presented as hazard ratios. The results suggest that patrilocal residence increased the hazard of having a second birth in a given month by 35%. Compared with the results from the previous analysis, the

Table 4.15 Tolerance Values of the Independent Variables in the Transition from First Birth to Second Birth Full Models

Variables	Tolerance Value	
Residential Pattern of Parents-in-law		
Others (ref)		
Patrilocal residence	0.76	
Adj. patrilocal residence	0.80	
Residential Pattern of Parents		
Others (ref)		
Matrilocal residence	0.76	0.99
Adj. matrilocal residence	0.80	0.99
Birth year	0.74	0.82
Age at marriage	0.82	0.82
Nationality		
Others (ref)		
Han	0.98	0.98
Place of residence		
Rural (ref)		
Urban	0.72	0.74
Education		
Less than high school (ref)		
High school or above	0.72	0.73
Income		
Logged household income per capita	0.92	0.93
Sex of first birth		
Male (ref)		
Female	0.98	0.98
Mean	0.83	0.89

Table 4.16 Proportionality Assumption Test for the Transition from First Birth to Second Birth Full Model Based on the the Residential Pattern of Married Women's Parents-in-Law

Variables	Rho	Chi Square	P-value
Residential Pattern of Parents-in-law			
Others (ref)			
Patrilocal residence	-0.052	0.360	0.549
Adj. patrilocal residence	-0.039	0.200	0.652
Birth year	0.166	7.880	0.005
Age at marriage	0.050	0.450	0.505
Nationality			
Others (ref)			
Han	-0.055	0.430	0.511
Place of residence			
Rural (ref)			
Urban	0.023	0.130	0.720
Education			
Less than high school (ref)			
High school or above	0.036	0.210	0.647
Income			
Logged household income per capita	0.073	0.710	0.399
Sex of first birth			
Male (ref)			
Female	-0.037	0.270	0.603
Global Test		9.940	0.355

Table 4.17 Proportionality Assumption Test for the Transition from First Birth to Second Birth Full Model Based on the the Residential Pattern of Married Women's Parents

Variables	Rho	Chi Square	P-value
Residential Pattern of Parents			
Others (ref)			
Matrilocal residence	-0.004	0.000	0.960
Adj. matrilocal residence	0.186	5.070	0.024
Birth year	0.188	10.360	0.001
Age at marriage	0.090	1.500	0.221
Nationality			
Others (ref)			
Han	-0.078	0.940	0.333
Place of residence			
Rural (ref)			
Urban	0.044	0.480	0.490
Education			
Less than high school (ref)			
High school or above	0.009	0.010	0.908
Income			
Logged household income per capita	0.095	1.180	0.277
Sex of first birth			
Male (ref)			
Female	-0.035	0.220	0.637
Global Test		14.770	0.098

Table 4.18 Estimates of the Hazard Ratios for the Transition from First Birth to Second Birth Models Based on the Residential Pattern of Married Women's Parents-in-Law

Variables		Model 5.1	Model 5.2	Model 5.3	Model 5.4
Main Effect					
Residential Pattern of Parents-in-law					
	Others (ref)				
	Patrilocal residence	1.344	1.240	1.028	1.055
	Adj. patrilocal residence	1.882**	1.726**	1.173	1.215
Birth year			0.926*	0.940	0.941
Age at marriage			0.930*	0.985	0.977
Nationality					
	Others (ref)				
	Han			0.641**	0.627**
Place of residence					
	Rural (ref)				
	Urban			0.437**	0.450**
Education					
	Less than high school (ref)				
	High school or above			0.416**	0.374**
Income					
	Logged household income per capita			0.729**	0.709**
Sex of first birth					
	Male (ref)				
	Female				3.045**
Time-Varying Effect					
Birth year			1.001**	1.001**	1.001**
Wald Chi-Square		8.43**	18.53**	76.34**	113.53**

Note: ** P-Value < 0.05; * P-Value <0.1

magnitude of the effect of patrilocal residence on the second birth was smaller than that of the effect on the first birth. In addition, its effect was not significant across all models and diminished after introducing control variables into the models. Without controlling for other factors, having parents-in-law as neighbors significantly increased the hazard of having a second birth in a given month by 88%. Similarly, this effect was diminished and its significance disappeared after controlling for all other factors. The evaluation of the over model fit using Cox-Snell residuals is presented in Figure 4.16. In general, the full model fits the data well. The variability about the 45° line was expected in the right-hand tail due to "the reduced effective sample caused by prior failures and censoring" (Cleves et al. 2010: 222).

Figure 4.16 Cumulative Hazards of Cox-Snell Residuals for the Transition from First Birth to Second Birth Full Model Based on the Residential Pattern of Married Women's Parents-in-Law

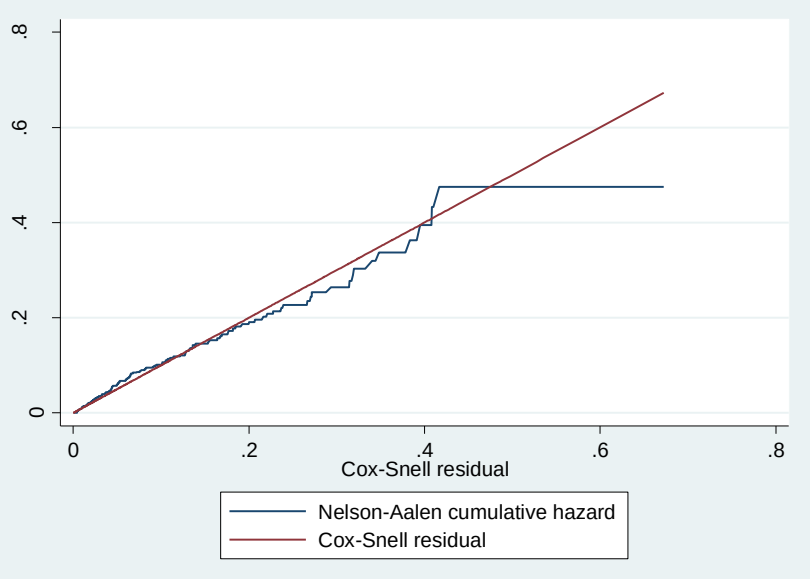


Table 4.19 shows the results of the Cox proportional hazards models estimating the hazard of having a second birth based on the residential pattern of married women's parents. According to the results, matrilocal residence decreased the hazard of having a second birth at a given time by 63.5% after controlling for other variables, but the effects of matrilocal residence were not significant. In this analysis, the effects of the adjusted matrilocal residence were divided into two parts in order to account for the non-proportional hazards. The first part accounted for the main effect, which was constant over time, while the second part accounted for the time-varying effect of having parents as neighbors. As a whole, its total effects changed with time. Taking the full model as an example, within approximately nine years after the first birth, having parents as neighbors decreased the hazard of having a second birth. However, nine years later, adjusted matrilocal residence increased the hazard of having a second birth (see Figure 4.17). The time-varying effects of adjusted matrilocal residence seemed to always be significant in this set of models (see Table 4.19). The overall model fits the data well, as shown in Figure 4.18.

Rather than family structure, socioeconomic status showed significant effects on the hazard of having a second birth in both sets of models. For example, compared with women in minority groups, being Han decreased the hazard of having a second birth by over 30%, controlling for all the other factors. Other than nationality, living in urban areas, higher education, and more income all decreased the hazard of having a second birth. Besides socioeconomic status, the sex of the first birth was a key factor. The

hazard of having a second birth for women who had a surviving daughter was more than twice the hazard for women who had surviving sons.

4.3.5 Conclusion

Family structure seems to play a less important role in the transition from the first birth to the second birth than in the transition from marriage to first birth. I hypothesized that patrilocal residence and adjusted patrilocal residence increased the risk of having second births, but the results did not provide any evidence to support those hypotheses. The hypothesized pattern was observed in the data, but the magnitude of their effects decreased and the significance did not remain after introducing the control variables. As in the previous analysis, co-residence with parents did not influence having a second birth. When I treated the effects of adjusted matrilocal residence as changing effects over time, the results showed significant estimates indicating that adjusted matrilocal residence decreased the hazard of having a second birth until the ninth year after the first birth, after which the adjusted matrilocal residence increased the hazard of having a second birth.

Table 4.19 Estimates of the Hazard Ratios for the Transition from First Birth to Second Birth Models Based on the Residential Pattern of Married Women's Parents

Variables		Model 6.1	Model 6.2	Model 6.3	Model 6.4
Main Effect					
Residential Pattern of Parents					
	Others (ref)				
	Matrilocal residence	0.365	0.361	0.457	0.365
	Adj. matrilocal residence	0.165**	0.184**	0.170**	0.168**
Birth year			0.927*	0.941	0.944
Age at marriage			0.925**	0.983	0.975
Nationality					
	Others (ref)				
	Han			0.651*	0.634**
Place of residence					
	Rural (ref)				
	urban			0.429**	0.439**
Education					
	Less than high school (ref)				
	High school or above			0.417**	0.371**
Income					
	Logged household income per capita			0.727**	0.706**
Sex of first birth					
	Male (ref)				
	Female				3.132**
Time-Varying Effect					
Residential Pattern of Parents					
	Adj. matrilocal residence	1.019**	1.016**	1.018**	1.019**
Birth year			1.001**	1.001**	1.001**
Wald Chi-Square		10.67**	29.23**	81.91**	131.63**

Note: ** P-Value < 0.05; * P-Value <0.1

Figure 4.17 Changing Effects of the Adjusted Matrilocal Residence for the Transition from First Birth to Second Birth Full Model

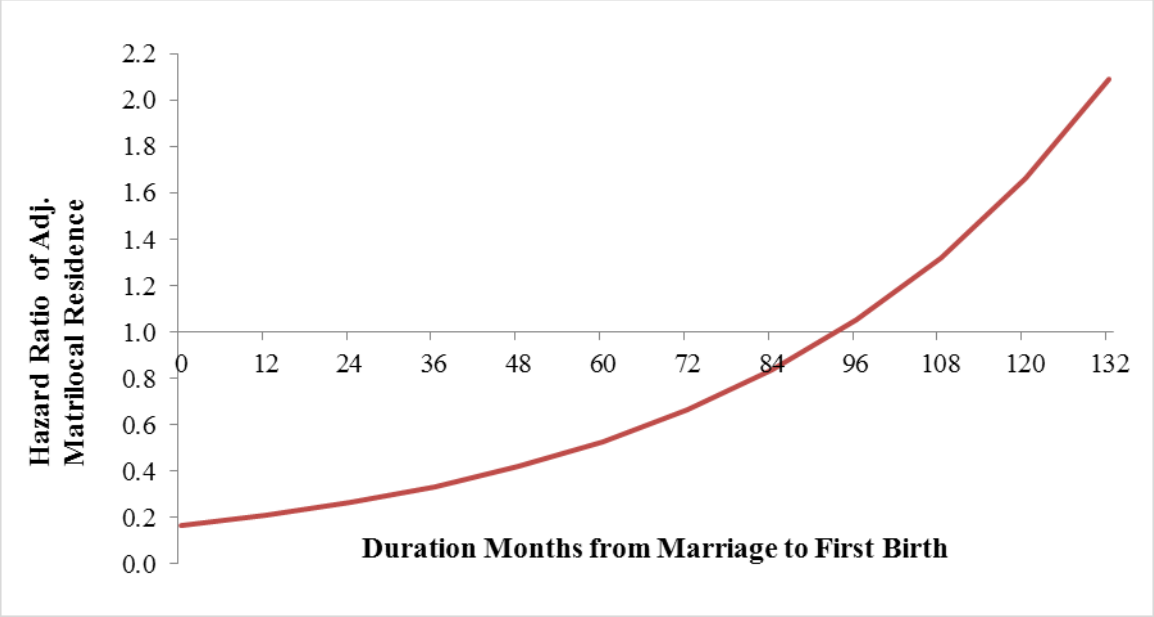
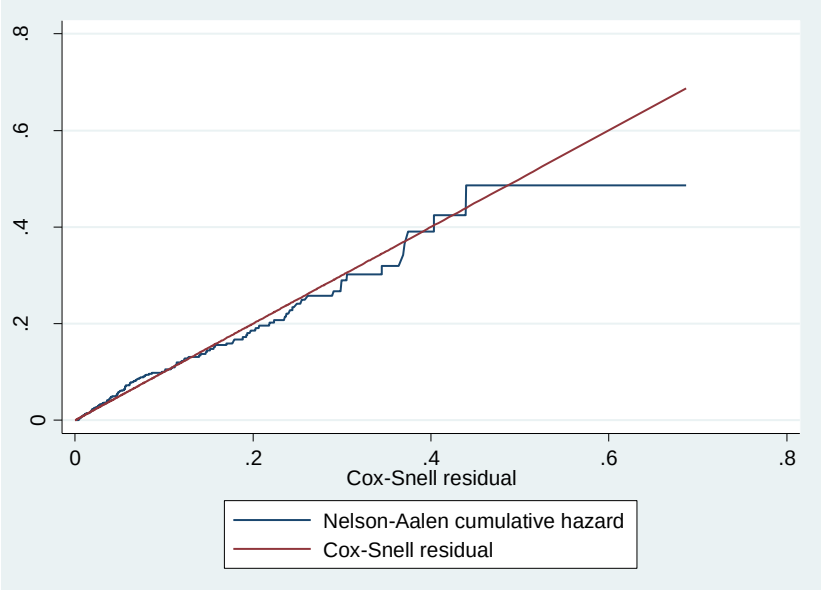


Figure 4.18 Cumulative Hazards of Cox-Snell Residuals for the Transition from First Birth to Second Birth Full Model Based on the Residential Pattern of Married Women's Parents



CHAPTER V

ANALYSIS OF FAMILY STRUCTURE AND PREMARITAL SEX

In this chapter I report the results of my modeling the effects of family structure on premarital sex of never-married women. In this chapter of my dissertation I use data from the Chinese Health and Family Life Survey. I hypothesized that co-residence with parents would decrease the risk of experiencing premarital sex. To test this hypothesis, I conducted two analyses to examine the effects of family structure on the attitudes of never-married women toward premarital sex, and on the behavior of premarital sex, utilizing logistic regression models. I first introduce the specific hypotheses, and then describe the dataset and the variables. Since these two analyses used the same dataset and the same independent variables, the only difference between them has to do with the dependent variables. After investigating the degree of strong multicollinearity in the independent variables, I present and interpret the results and draw conclusions.

5.1 Hypotheses

The general hypothesis to be tested in this chapter is that co-residence with parents decreases the risk of experiencing premarital sex. I will elaborate upon this hypothesis and develop two specific hypotheses: one concerns the attitudes of never-married women towards premarital sex, and the other concerns the behavior of never-married women with regards to premarital sex. Therefore, the following two are the specific hypotheses:

1. Never-married women who co-reside with their parents have more conservative attitudes toward premarital sex than those who do not co-reside with parents.
2. Never-married women who co-reside with their parents are less likely to have premarital sex than those who do not co-reside with parents.

5.2 Dataset

The analyses in this chapter utilize data from the Chinese Health and Family Life Survey. Although the CHFLS is a nationally representation sample of the adult population aged 20 to 64, in these analyses I only use the young, never-married, female respondents. To investigate the effects of family structure (and especially that of co-residence with parents) on premarital sex, the sample had to consist of never-married women, and these never-married women had to have had the opportunity to co-reside with their parents. Therefore, there were two major underlying considerations for selecting a proper subsample. First, marriage is prevalent in China. As age increases, the probability of being never-married for a woman decreases. Among the population of women aged 35 to 64, less than 1% remained never-married according to the data from the CHFLS. Second, the chance of co-residence with parents for a never-married woman decreases as her age increases; this results from several factors, the most important of which is the death of her parents. Therefore, after selecting all never-married, female, adult respondents into the sample, I excluded those who were older than 34, in order to generate a sample of young never-married adults. Finally, 206 never-married women aged 18 to 34 from the CHFLS sample were selected. Since they were from a nationally

representative sample, these 206 women represented a population of more than 29 million young never-married women in China. In order to get accurate estimates, I used the Stata's *svy* (survey) suite of commands to adjust this subsample for sample strata, primary sampling units, and population weights for all the fitted models in this study.

5.3 Conceptualization and Operationalization

The first dependent variable measured the women's attitudes toward premarital sex. This variable was constructed based on a survey question reflecting the participants' opinions on premarital sex. Particularly, the question asks if two people having sex before marriage is morally acceptable, given the fact that they eventually get married (Population Research Center at the University of Chicago n.d.). All the responses were thus divided into two categories: whether premarital sex is acceptable or whether it is not, and coded as a dummy variable I called "liberal attitudes." Participants with liberal attitudes (that is, the attitude that premarital sex is acceptable) had values of 1, while those who thought premarital sex was unacceptable had values of 0.

The second dependent variable measured the premarital sexual behavior, labeled as "premarital sex." This was a constructed variable measuring whether a never-married participant had sex in the year previous to the survey (Population Research Center at the University of Chicago n.d.). The dummy variable had two values: 1 for never-married women who had sex in the year previous to that of the survey time, and 0 for those who did not. Importantly, this variable focused on the participant's behavior in the past year. Therefore, a value of 0 did not indicate that the never-married woman had never experienced premarital sex, but rather she did not have premarital sex in the year

previous to that of the survey time. By focusing on the most recent year instead of tracing back through a relatively longer period, I sought to minimize the possibility of falsely attributing earlier behavior to a current family structure (assuming that the family structure did not change during the past year).

The principal independent variable in this analysis was family structure. Since co-residence with parents is a key factor, according to the findings from the previous literature, the never-married young women co-residing with parents were distinguished from other women in the survey by a dummy variable named "Co-residence with parents," where 1 represented never-married women who co-resided with their parents, and 0 represented those who did not co-reside with their parents.

Besides family structure, I also included several control variables in order to test the independent effects of family structure on premarital sex. The only demographic variable was "Age," an interval variable measuring the number of years a participant was alive through the date of the survey interview. Then I introduced control variables measuring socioeconomic status, including the place of current residence, education, and income. The dummy variable "Urban" reflected the current place of residence with 1 for an urban area and 0 for a rural area. Two dummy variables, "High school" and "College or above," were used to separate three categories of education; "Middle school and below" was used as the reference group. I used the dummy variable "500-999" and "1000 or higher" to measure monthly income. A value of 1 for the dummy variable "500-999" represented never-married women with a monthly income ranging from 500 RMB to 999 RMB; a value of 1 for the dummy variable "1000 or higher" represented

never-married women with a monthly income equal to or higher than 1000 RMB. Never-married women with a monthly income less than 500 were used as the reference group with a value of 0 for the two dummies.

5.4 Descriptive Statistics

The 206 never-married women in this dataset represented a population of over 29 million individuals. I will now present the estimate statistics of this population by utilizing the Stata *svy* (survey) suite of commands (See Table 5.1). First, I will describe the two dependent variables. In this population, 55.5% of all women had liberal attitudes toward premarital sex; 44.5% had conservative attitudes toward premarital sex. In other words, 55.5% responded that premarital sex was acceptable if marriage was expected, while 44.5% believed that premarital sex was unacceptable even if marriage was expected. Concerning their behavior, however, only 13% had experienced premarital sex in the year previous to that of the survey interview date.

Now I will describe the independent and control variables. Most women lived with their parents; co-residence with parents accounted for 75.9% of all the women, while 24.1% did not live with their parents. The average age of the population was 21.6 years. One half of the population lived in urban areas while the other half lived in non-urban areas. Of this population, 12.4% graduated from college and 31.3% listed high school as their highest formal education. This left 56.7% with a highest formal education of lower than high school. Of these women, 13.2% earned a monthly income of 1000 RMB or higher, 22.0% earned a monthly income ranging from 500 RMB to 999 RMB, and 64.8% earned a monthly income lower than 500 RMB.

Table 5.1 Descriptive Statistics for the Subpopulation of the Never-Married Women

Variables	Mean/Proportion	Linearized Std. Err.	95% Conf. Interval	
Dependent Variable				
Attitude towards premarital sex				
Conservative (ref)				
Liberal	0.555	0.088	0.376	0.735
Had sex in last year				
No (ref)				
Yes	0.130	0.039	0.051	0.209
Independent Variable				
Family Structure				
Others (ref)				
Co-residence with parents	0.759	0.044	0.669	0.848
Control Variable				
Age	21.642	0.424	20.780	22.504
Place of residence				
Rural (ref)				
Urban	0.506	0.117	0.267	0.745
Education				
Middle school or below (ref)				
High school	0.313	0.026	0.260	0.366
College or above	0.124	0.044	0.034	0.214
Monthly income				
Less than 500 (ref)				
500-999	0.220	0.060	0.098	0.343
1000 or higher	0.132	0.042	0.048	0.217
n = 209				
Subpopulation size = 29,651,538				

5.5 The Effects of Family Structure on Attitudes toward Premarital Sex

As discussed above, all logistic models discussed in this chapter were constructed by applying the Stata *svy* (survey) suite of commands to adjust the survey design and provide more accurate standard errors for the estimates of the coefficients. However, due to a lack of proper measures for post-estimation evaluation and diagnostics for logistic regression models based on complex survey design samples, I used alternative methods to diagnose the presence of multicollinearity and evaluate the goodness of fit of models. To be specific, I re-estimated the logistic regression models by applying the sampling weights in the standard logistic regression program using the same dependent and independent variables, and then investigated the presence of multicollinearity and evaluated the goodness of fit based on the re-estimated logistic regression models.

The tolerance values of all the independent variables are shown in Figure 5.1. All the independent variables had tolerance values higher than 0.4, indicating that there was no serious problem in terms of multicollinearity.

The dependent variable in this set of models was the dummy variable "Liberal attitudes." The family structure, age and variables representing socioeconomic status were introduced into the models as independent variables, step by step. The results of these logistic regression models are shown in Table 5.2. Women co-residing with their parents did not show any difference in terms of their attitudes toward premarital sex. The effects of family structure on having liberal attitudes toward premarital sex were not significant. Actually, even the full model failed to reject the null hypothesis of the Wald

Chi-square test that at least one of the coefficients for all the independent variables did not equal 0. In other words, none of the selected independent variables were good predictors of never-married women's attitudes toward premarital sex.

Figure 5.1 Tolerance Values of the Independent Variables in the Attitudes toward Premarital Sex Full Model

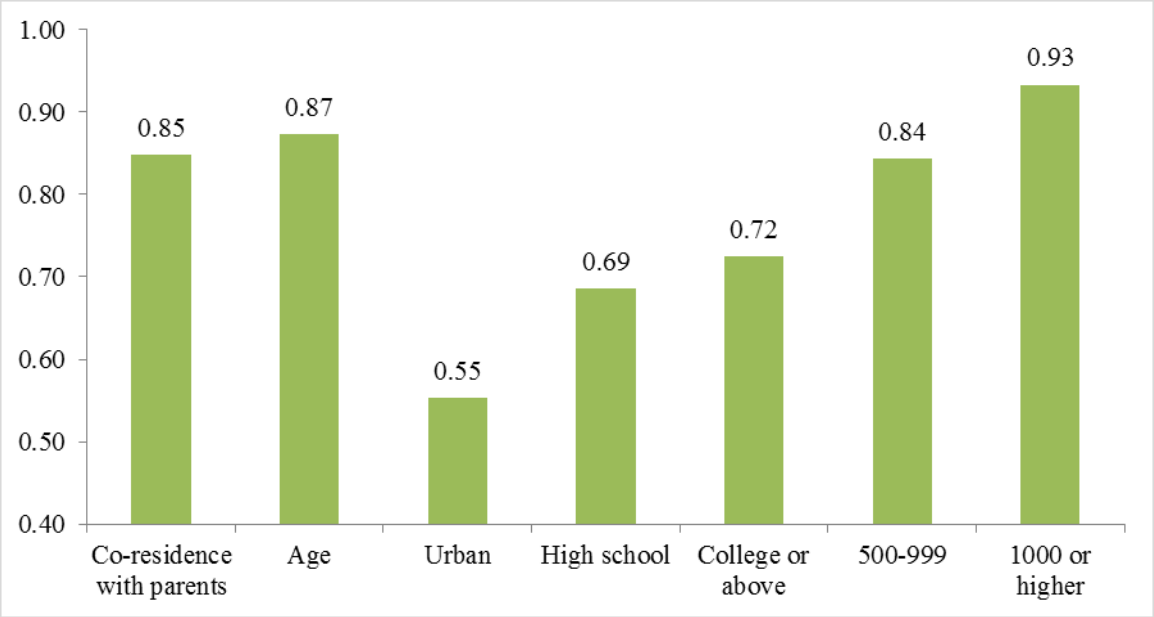


Table 5.2 Estimates of the Odds Ratios of the Liberal Attitudes toward Premarital Sex

Variables	Model 7.1	Model 7.2	Model 7.3
Family Structure			
Others (ref)			
Co-residence with parents	1.552	1.550	1.230
Age		0.982	1.016
Place of residence			
Rural (ref)			
Urban			0.655
Education			
Middle school or below (ref)			
High school			2.542**
College or above			1.022
Monthly income			
Less than 500 (ref)			
500-999			1.914
1000 or higher			3.591*
Wald Chi-Square	0.39	0.40	4.56
Pseudo R Square	0.006	0.007	0.057

Note: ** P-Value < 0.05; * P-Value <0.1
The Wald Chi-Square test and Pseudo R Square are based on the re-estimated models.

5.6 The Effects of Family Structure on Premarital Sexual Behavior

After finding no significant effects of family structure on attitudes toward premarital sex, I proceeded to examine the effects of family structure on the behavior of premarital sex. The dependent variable in this set of logistic regression models was the dummy variable "Premarital sex," measuring whether a never-married woman had had sex in the past year. The major independent variable, family structure, and the control

variables were the same as those for the previous analysis. The results are shown in Table 5.3.

Table 5.3 Estimates of the Odds Ratios of Having Premarital Sex in the Last Year

Variables	Model 8.1	Model 8.2	Model 8.3
Family Structure			
Others (ref)			
Co-residence with parents	0.220**	0.210**	0.394**
Age		1.199	1.134
Place of residence			
Rural (ref)			
Urban			16.050**
Education			
Middle school or below (ref)			
High school			0.463
College or above			0.313
Monthly income			
Less than 500 (ref)			
500-999			1.716
1000 or higher			3.000**
Wald Chi-Square	6.22**	13.18**	28.21**
Pseudo R Square	0.076	0.104	0.244

Note: ** P-Value < 0.05; * P-Value <0.1
The Wald Chi-Square test and Pseudo R Square are based on the re-estimated models.

I found that co-residence with parents significantly decreased the risk of women having sex in the past year (78% for never-married women). After introducing the control variables into the logistic regression models, the magnitude of the effects of co-

residence with parents decreased, but the significance of the effect remained. The odds of having sex in the past year for never-married young women who co-resided with their parents were 60% lower than for those who did not co-reside with their parents, after controlling for all other variables.

Besides family structure, socioeconomic status significantly influenced the behavior of premarital sex in never-married young women. The odds of having sex in the year previous to that of the survey for never-married young women who lived in urban areas were more than fifteen times higher than for those who lived in rural areas, after controlling for all other variables. Higher income also seemed an important factor. Higher monthly income was associated with higher odds of having sex in the year previous to that of the survey.

5.7 Conclusion

In this chapter, I have examined the effects of family structure on attitudes toward premarital sex and the behavior of premarital sex of never-married women. Contrary to my expectations about the first hypothesis, family structure was not shown to have any significant effect on women's attitudes toward premarital sex. However, co-residence with parents tended to keep never-married young women away from being involved in premarital sex. This finding provides evidence in support of my second hypothesis that never-married women who co-reside with their parents are less likely to have premarital sex.

CHAPTER VI

IMPLICATIONS AND CONCLUSIONS

In this final chapter, I first discuss my major independent variable, family structure, and discuss its demonstrated effects on marital fertility and premarital sex. Then I address implications for future research regarding the association between family structure and fertility. My research had two major objectives, and both were geared toward a better understanding of the association between family structure and fertility, as follows: (1) to examine the effects of family structure on marital fertility, and (2) to examine the effects of family structure on premarital sex. In the next two sections, I describe and discuss the major independent variable, family structure.

6.1 Family Structure of Married Women

In this research, I used two separate sets of dummy variables to measure the family structures of married women. The first set of variables focused on the residential patterns of married women's parents-in-law, and consisted of two dummy variables: patrilocal residence (co-residence with parents-in-law) and adjusted patrilocal residence (quasi-coresidence with parents-in-law). Married women who did not co-reside with, or have their parents-in-law as, their neighbors served as the reference group. The CHNS data provided evidence of the prevalence of patrilocal residence in contemporary China. The subsample of married women who had not given birth were recorded as spending 57.6% of their months under observation in co-residence with their parents-in-law, and

8.1% of their months under observation neighboring with their parents-in-law (see Table 4.8). The subsample of married women who had one surviving birth spent 31.8% of their months under observation in co-residence with their parents-in-law, and 21.2% of their months under observation neighboring with their parents-in-law (see Table 4.14). This pattern is also evident in a snapshot of the family structure in China of all married women who had at least one surviving child in 2006. Of these women, 27.8% lived with their parents-in-law, and 21.2% had their parents-in-law as neighbors (see Table 4.5). In other words, nearly half of the married women in my study co-resided or quasi-coresided with their parents-in-law at least for some period of time after their marriage.

Concerning the prevalence of patrilocal residence and quasi-patrilocal residence, there was an apparent difference between married women who had not given birth and those women who had. The married women with no births were most likely newly-married women, given the prevalence of first births in China. Therefore, the prevalence of patrilocal residence among this group of women seems to suggest that a shortage of housing was an important reason for their co-residence. The strong obligation felt by Chinese youth to take care of their parents also could contribute to the co-residence. However, a decrease in the proportion of patrilocal residence and an increase in the proportion of quasi-coresidence among women with surviving children suggested that taking care of parents was not a necessary condition for co-residence. The most likely scenario is that young couples depended upon the husband's parents for housing due to a lack of financial resources to set up independent households (Zhang 2004). When such couples grow older, had their own children, and became capable of setting up

independent households, their parents' need for care and financial support likely led to a choice of quasi-coresidence. This dynamic pattern implies that both economic factors and the traditional Chinese norms contributed to the form of the family's structure, though each factor may well have played different roles at different stages. During the first few years, young couples are more likely to depend on the husbands' parents. Later in life, parents are more likely to depend on their children. This reverse relationship also implies that the effects of the same family structure may be different at different stages in the family's life.

In Chapter II, I discussed how matrilocal residence and quasi-matrilocal residence could be well adapted in contemporary Chinese society as a strategy of family recruitment for daughter-only families. In this research, I employed a second set of variables measuring family structure, focusing on the residential patterns of married women's parents using two dummy variables: matrilocal residence (co-residence with parents) and adjusted matrilocal residence (quasi-coresidence with parents). Data from the CHNS suggested that co-residence with the wife's parents was not as prevalent as was patrilocal residence. In general, less than 10% of married women either co-resided with their parents or quasi-coresided with their parents (see Tables 4.5, 4.9, and 4.15). As Fong (2002) has noted, "as in the past, grooms are expected to provide marital housing" (p. 1104). Even though parents may be willing to provide daughters with marital housing, it continues to be more likely that the husband's parents will feel an "obligation" to purchase housing to attract daughters-in-law. This expectation was

reinforced by the housing reforms of 1997, which led to a rapid increase in housing prices.

As a result of all of the factors discussed above, patrilocal residence (i.e., co-residence or quasi-coresidence with the husband's parents) seems to have been well preserved in contemporary Chinese society. Since the formation of a patrilocal residence or an adjusted patrilocal residence family structure is not likely to be caused solely by the pursuit of maintaining traditional norms, the effects of this family structure on fertility may vary from those occurring in traditional Chinese society.

6.2 Family Structure and Marital Fertility

In Chapter IV, I tested a series of hypotheses concerning the effects of family structure on marital fertility. In general, I hypothesized that co-residence and quasi-coresidence with parents-in-law increased marital fertility by promoting a higher level of desired fertility and by accelerating the transition from marriage to first birth and the transition from first birth to second birth. Conversely, I also hypothesized that co-residence and quasi-coresidence would not affect marital fertility. Using data from the CHNS for the years 1991 to 2009, I examined the effects of family structure on marital fertility by estimating separate sets of statistical models.

Before moving to the multivariate logistic regression models of desired fertility, I examined the bivariate association between family structure and desired fertility across six survey panels. The results are consistent across the different panels. Women who co-resided with their parents-in-law were more likely to want another child. Women who had their parents-in-law as their neighbors also showed a higher tendency to want

another child, as compared with those who neither co-resided nor neighbored with their parents-in-law (see Table 4.3). The residential patterns of parents did not seem to show any significant effects on desired fertility (see Table 4.4). In my multivariate analysis I estimated logistic regression models and their results showed the significant effects of patrilocal residence and adjusted patrilocal residence (see Table 4.6). These findings provided evidence to support the first four hypotheses.

I next estimated Cox proportional hazard models and focused on the transition from marriage to first birth. As hypothesized, patrilocal residence significantly increased the hazard of having a first birth after marriage. However, contrary to my hypothesis, the effects of adjusted patrilocal residence were not significant (see Table 4.12). Also, the results with respect to the effects of matrilocal residence and adjusted matrilocal residence supported my hypothesis that the residence patterns of parents did not seem to influence children's transitions from marriage to first birth (see Table 4.13).

Finally, in Chapter IV I examined the hypotheses concerning the transition from first birth to second birth. After controlling for all the other variables, the residential patterns of parents-in-law did not appear to show a significant level of influence on the transition from first birth to second birth (see Table 4.18), even though the married women spent half of their observed months under co-residence or quasi-coresidence with their parents-in-law. This finding was inconsistent with my hypotheses. Conversely, matrilocal residence did not affect the transition from first birth to second birth, supporting my hypothesis. In this analysis, I treated the effects of adjusted matrilocal residence as time-varying. The results of the Cox proportional hazards model showed

that during the first eight years after a first birth, having parents as neighbors decreased the hazard of having a second birth; after that, having parents as neighbors increased the hazard of having a second birth (see Figure 4.17). Although this finding does not support my hypothesis, this finding should be carefully interpreted. First, having parents as neighbors is very rare in contemporary China (see Table 4.14). Second, the hazard rate of having a second birth more than eight years after a first birth was lower than 0.2%, and decreased rapidly (see Figure 4.15). Even if having parents as neighbors significantly doubled the odds of having a second birth 10 years after the first birth (see Figure 4.16), the odds of having a second birth at that time was still extremely low.

6.3 Family Structure of Never-Married Women

The family structure of never-married women is much simpler. In my research, I focused on the residential patterns of women's parents, since never-married women have not yet formed independent family households. My data on the population of never-married young women showed that 76% lived in their parents' households (see Table 5.1). Regardless of college students and migrant workers who were unlikely to live in their parents' households, the majority of never-married young women in my sample depended on their parents for housing. This is not surprising when housing prices are high and marital housing is expected to be provided by husbands' parents. However, we must still ask the question: did co-residence ensure that parents passed their attitudes regarding fertility and family structure to their daughters, and if so, did these attitudes control their behavior? I discussed the effects of family structure on premarital sex in Chapter V, and I will summarize my findings in the next section.

6.4 Family Structure and Premarital Sex

Chapter V examined the effects of family structure on premarital sex by focusing on the attitudes towards and behavior of premarital sex. Unexpectedly, my first analysis in this chapter showed that more than half of the never-married women studied found premarital sex morally acceptable among couples who would eventually get married, and co-residence with parents did not seem to make any difference in terms of the their attitudes (see Table 5.2). There are two possible explanations for this result. First of all, the assumption of an expected marriage altered the meaning of "premarital sex." In this situation, sex before marriage could be used as a strategy to ensure the marriage. If two people are already engaged to be married, having "premarital sex" actually is often regarded as having sex within the marriage union. Thus, it is not a problem for either the couple or their parents. In addition, the attitudes of others towards premarital sex are not necessarily consistent with a couple's own behavior. This may reflect the notion that young adults in contemporary China are more tolerant towards untraditional behavior in general, regardless of the influence of traditional attitudes (if there are any) from parents. These two explanations imply that concerning their own behavior, premarital sex of never-married women was less preferred and more controlled by their parents.

The second analysis in Chapter V provided evidence to support my hypothesis, as well as the second explanation (discussed above). Tracing one year back from the date of interview, data from the CHFLS indicated that only 13% of the never-married young women in my sample had reported being involved in premarital sex (see Table 5.1); this was much lower than the proportion of those participants with liberal attitudes toward

premarital sex. In addition, co-residence with parents significantly decreased the odds of having premarital sex, by 60% (see Table 5.3).

6.5 Implications and Future Research

In this research, I have shown that after controlling for relevant factors, co-residence or quasi-coresidence with parents-in-law significantly accelerates the transition from marriage to first birth, and promotes a desire for more children. This finding provides new evidence for the classical theoretical discussion that the extended family living structure encourages a higher level of fertility. It is not clear whether the preference for high fertility believed to be characteristic of the older generations, or the convenient child care provided by the parents-in-law, plays a more important role in the transition. If a first birth is generally preferred, the availability of child care services provided by parents-in-law may be a more decisive factor. However, the lack of effect of matrilocal and adjusted matrilocal residences on first birth and desired fertility suggests that "the ideological factor cannot be ignored" (Chen 2006: 62). In a traditional culture, only husbands and parents-in-law are subject to the responsibility of continuing the family line, which explains why parents-in-law are more likely to encourage early childbearing.

Compared to first births, second births are significantly impacted by factors other than family structure. Instead of family structure, socioeconomic status plays a key role in the transition from first birth to second birth. Being a member of the majority Han nationality, living in urban areas, and having a higher level of education and a larger income all significantly decreased the hazard of having a second birth. In addition, the

sex of the first birth played an important role; a female first birth significantly increased the hazard of having a second birth (see Table 4.18). Since these factors are consistent with the one-child policy which only grants second births to couples with lower socioeconomic status (such as those who are members of minority groups and those living in rural areas), and couples with only a daughter (under some circumstances), it is difficult to disentangle the effects of socioeconomic status, the one-child policy, and son preference. If the difference in the transition from the first birth to the second birth largely is caused by the institutional factor (namely, the one-child policy), I would argue that without the one-child policy, patrilocal residence would become more influential given the finding that patrilocal residence encourages early childbearing and a higher desired level of fertility.

My research also confirmed the effects of family structure on premarital sex in terms of behavior, but not in terms of attitudes. Co-residence with parents decreased the odds of engaging in premarital sex. This may result from a strict level of parental control, either psychologically or physically. As discussed in Chapter II, co-residence facilitates communication and interaction between parents and children such that parents can more easily and directly convey their attitudes regarding sex to their children, and exert a certain degree of control over their children's behavior in both direct and indirect ways. The analysis of the effects of family structure on attitudes toward premarital sex, however, may be somehow biased due to the assumption that the couple is expecting one day to be married. Therefore, without this assumption I expect the results would yield a

higher proportion of never-married women with conservative attitudes toward premarital sex, although the effects of family structure on this conclusion is not clear.

In future research, I would like to investigate the mechanisms behind these findings and answer some unresolved questions. For example, I would like to examine how patrilocal residence encourages early childbearing behavior. This type of analysis would require data regarding the allocation of child care after birth. In addition, I would like to understand the effects of family structure on the transition from the first birth to the second birth in those cases where the one-child policy is absent. With the available data collected from certain populations (such as those who are not subjected to the one-child policy), I could easily separate the effects of family structure from the effects of other influential factors. Finally, it would be useful to investigate the effects of family structure on premarital fertility. I expect that co-residence with parents significantly decreases the risk of premarital births. Unfortunately, there are no such data available for this type of analysis, at least to my knowledge.

6.6 Conclusions

The fertility transition has been and always will be an essential area of demography. Due to the rapid decline in fertility and the well-preserved traditional family structure, there is significant interest in investigating the effects of family structure on fertility in contemporary China. Births allowed by the one-child policy are significantly promoted by patrilocal and adjusted patrilocal types of residences. Although higher order births seem to be more controlled by the one-child policy and/or the socioeconomic status of the women, the fact that patrilocal residence and adjusted

patrilocal residence both are associated with a desire for a higher level of fertility implies that without the one-child policy, higher order births would solely be a personal issue and would be influenced by family rather than institutional factors. The significant effects of co-residence with parents on limiting premarital sex also have been evident in this research. In sum, this dissertation provides new evidence for understanding the effects of family structure on fertility, which is very important for better predicting fertility changes and trends, given the fact that the one-child policy inevitably will be adjusted or invalidated in the future, and fertility eventually will return to a private area where the family is the basic unit of reproduction.

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